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ABSTRACT

The primary objective of the Task Force on Space and Utilization was to prepare a building space and utilization guide that could serve as a key element in the development of a formula for the allocation of capital funds to the Ontario universities. Part 1 of the Task Force report presents a brief history of the development of capital financing since 1964. Outlined are the efforts to establish an effective and satisfactory system of capital financing and a review of the deliberations and procedures of the Task Force. A summary of the Task Force's recommendations on building space standards is included. Part 2 presents a more detailed statement of the arguments and findings of the Task Force. This selection is of interest to those who have a specialized involvement in and concern for the problems of providing for the physical capital needs of the universities. (Author/HS)

Council of Ontario Universities
Conseil des Universités de l'Ontario

Building Blocks

Background Studies on the Development
of a Capital Formula for Ontario

VOLUME 1

Report of the Task Force
SPACE AND UTILIZATION

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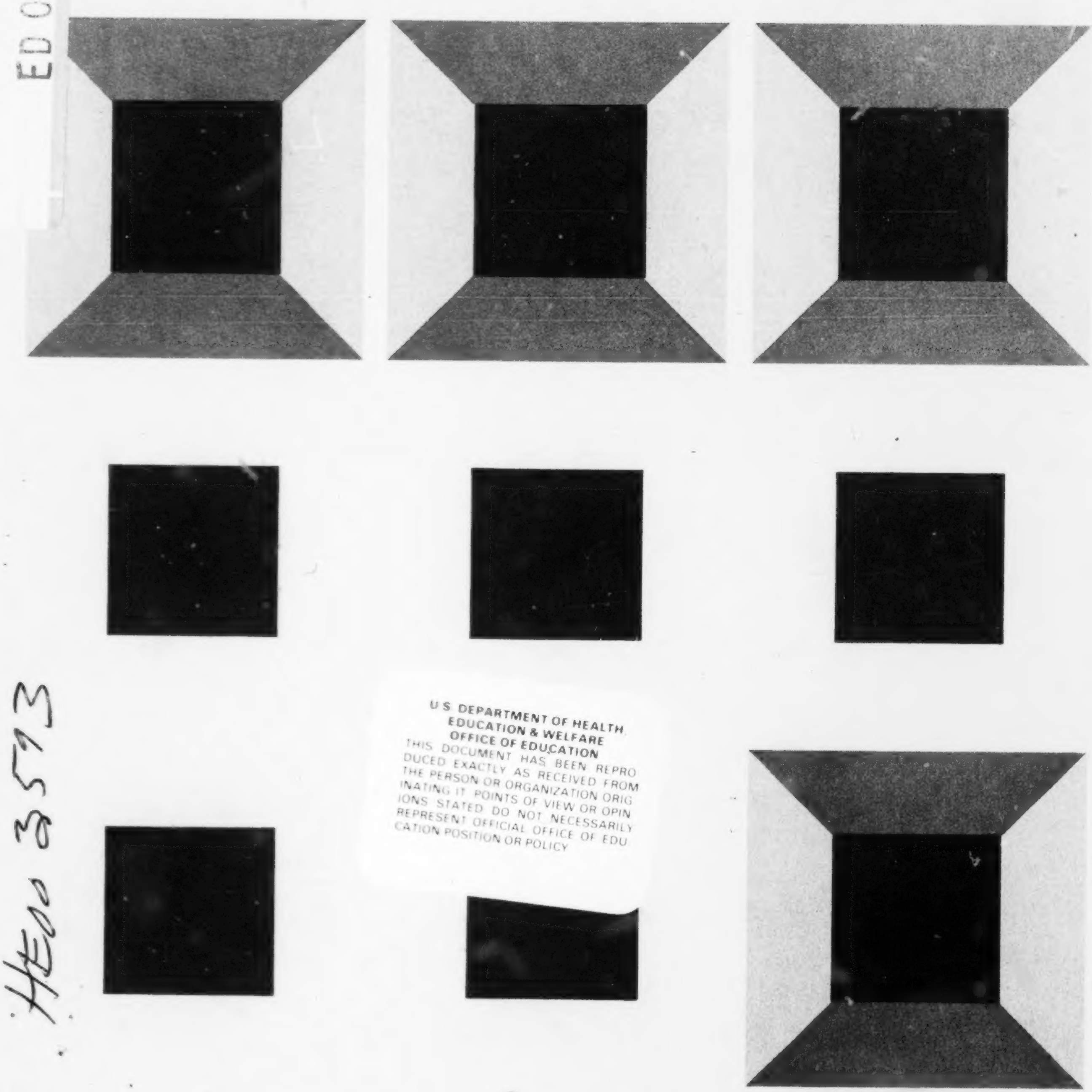

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REPORT OF

THE TASK FORCE - SPACE AND UTILIZATION

Introduction
and
Part I

Problem, Approach and Conclusions

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INTRODUCTION

The primary objective of the Task Force - Space and Utilization was to prepare a building space and utilization guide which could serve as a key element in the development of a formula for the allocation of capital funds to the Ontario universities.

The general pattern of a useful capital formula is now well recognized. The format comprises a data base providing an existing "space inventory" at a given point in time, a measure or measures of the building space required according to the kinds and quantities of use or projected use, and an index of dollar costs. Each of these elements presents many difficulties to be resolved and choices to be made before an acceptable formula producing satisfactory results can be devised. The general formula is unlikely to reach the level of refinement where it serves the total capital needs of the universities. It will, however, be satisfactory if it embraces most of these needs and identifies additional minor needs to be dealt with in other ways within the capital system.

A formula of the pattern indicated, if well devised and applied, can serve its purposes very well, if not ideally. It will have some inherent and unavoidable shortcomings to which attention will be drawn later in this report. However, these shortcomings should be recognized as inherent in the system rather than peculiar to the particular measures used. It was not the function of the Task Force to seek an entirely new approach to the problem. This was an appropriate limitation, since much effort has already been expended in the development of the pattern, and a search for a workable alternative could be frustrated by the present state of the art of university capital funding.

In July, 1971, the Council of Ontario Universities appointed this Task Force on Space and Utilization to work within the total effort directed toward the development of a space formula. The Task Force was asked to prepare a space and utilization guide for submission to the Committee on Capital Financing of COU with a view to the guide being incorporated with appropriate cost data in a capital funds allocation system. In our terms of reference (Appendix B), we were directed to review the document "Guidelines for Facilities Planning and a Capital Formula" and other materials, and to test the space and utilization guide at five universities - Guelph, Carleton, McMaster, Western and Brock. The membership of the Task Force included a representative from each of the tested universities.

We have met twelve times and have proceeded as directed by our terms of reference. Individual members of the Task Force, especially those from the tested universities, have as well devoted much time to the assembly and analysis of data, and to the review of materials developed during the study or available from other sources.

Throughout the project, the Task Force was mindful of the fact that its assignment did not embrace the factor of dollar costs. It did realize, however, that its conclusions on space standards must lend themselves to a conversion of space "entitlement" to dollar amounts which would, if desired, give effect to differential costs.

The proposed space standards apply to building space only, without incorporation of costs or cost differentials. They are not directly comparable to measures of formulae which combine space and cost differentials in one factor. The present interim capital formula, for example, is said to reflect cost differences, at least to some degree, in the enrolment weighting. The system of classification and standards proposed by the Task Force will allow cost differentials to be incorporated into the final formula.

Special Task Forces were established to study the space requirements of faculties of health sciences and education. The Task Force - Space for Education has reported and the recommendations contained in this report are applicable for support of faculties of education. The Task Force - Health Sciences is expected to report during the summer of 1972. Areas which require funding but are not included in the recommendations of the Task Force are listed in Appendix C. These include areas for site services and student residences.

Part I presents a brief history of the development of capital financing since 1964. Outlined are the efforts to establish an effective and satisfactory system of capital financing and a review of the deliberations and procedures of the Task Force. A summary of the Task Force's recommendations on building space standards is included.

Part II presents a more detailed statement of the arguments and findings of the Task Force. This section is of interest to those who have a specialized involvement in and concern for the problems of providing for the physical capital needs of the universities. The available evidence and the considerations upon which our conclusions are based are found in this part and in supporting appendices.

1. HISTORICAL BACKGROUND

From 1964 to 1969 the Ontario universities received capital monies through a project approval procedure. Each project, after passing through the appropriate review stages at the university, was examined through a multi-step approval process by the Capital Support Branch (formerly the Architectural Services Branch) of the Department of Colleges and Universities (formerly the Department of University Affairs). Though the projects were assessed at the institutional level with respect to the particular needs of each university there was little or no rationalization of the allocation of capital funds at the system level. Meanwhile the contributions from the provincial government increased from approximately $25 million in the 1962-63 academic year to over $125 million in 1968-69. (17)

In October, 1967 COU[i] proposed to CUA the undertaking of a joint study to develop an objective system for distributing capital support for university physical development. On October 2, 1967, the Joint Capital Studies Committee, composed of three members from CUA and three from the Committee on Capital Financing of COU, began its work. (The interrelationships between these various committees are illustrated in Appendix G). It was decided to engage consultants to assist in the preparation of a data base to include an inventory of space and studies of space utilization. A contract was awarded to Taylor, Lieberfeld and Heldman.

One of the original concepts was that any capital formula should closely parallel the operating grants formula introduced in 1967.

> The purpose of a formula is to provide an objective mechanism for determining the share of the total Provincial operating grant to be allocated to each university. The use of a formula for such distribution presupposes that the amount available will be sufficient, together with other major sources of income, to enable the university system to continue to function at least at its present level of excellence.(18)

In developing a capital formula it was the intent to incorporate many of the features sought in the operating grants formula: objectivity and equity, consistent standards, the opportunity for the provincial government to exert a primary control over its total obligation, and an incentive for each institution to allocate and manage its resources. The

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[i] The following acronyms appear frequently in the report:

CUA - Committee on University Affairs
COU - Council of Ontario Universities (formerly the Committee of Presidents of Universities of Ontario)
DCU - Department of Colleges and Universities
TLH - Taylor, Lieberfeld and Heldman

present interim capital formula, except for minor modifications, was derived during the Fall of 1968 and early 1969. At that time many of the analyses undertaken by TLH were incomplete, making it impossible for the Joint Capital Studies Committee to derive a formula with definitive standards.

The Committee on University Affairs concluded that the province was entering an era when capital resources would become scarcer. Any requests to the Provincial Treasurer would have to be based on more conclusive evidence than had normally been presented in the past. It was thought that a formula, similar in form to the operating grants formula, would fulfill this requirement. Because of the lack of data, and therefore because a good deal of judgement would be required, CUA felt that it would be unfair to force the university representatives of the Joint Capital Studies Committee to make decisions on specific factors in a formula at that time. Instead, the university representatives were invited to comment on a formula developed by CUA for presentation to the Provincial Treasury.

On January 10, 1969, Dr. D. T. Wright, Chairman of the Committee on University Affairs wrote to Dr. A. D. Dunton, at that time Chairman of the Committee of Presidents of Universities of Ontario, announcing that CUA had made recommendations to the Provincial Treasurer regarding capital support for 1969-70 based on a "sound realistic" approach (the interim capital formula). This capital formula with some amendments has been used in Ontario since that date.

The Committee on University Affairs was careful not to terminate further development of the formula and urged the Joint Capital Studies Committee to consider alternate means for allocating capital monies or to recommend changes to the interim formula.

> The Committee on University Affairs' members also feel that their recommendations this year (the interim capital formula) and their judgements should not in any way prejudice the development of a satisfactory formula for future use.(19)

The interim capital formula is based on enrolment projections. The projected enrolment is weighted according to programme with the weights ranging from one for undergraduate students in a liberal arts or general science programme to four for a doctoral candidate in a laboratory-oriented discipline (a complete listing of the weighting factors is included in Appendix E). The weights taken are to reflect both space differentials and costs for the various programmes. The weighted enrolment projections are multiplied by a unit factor (96 net assignable square feet) to derive an estimate of total space required.

> A basic allocation inventory was then established. This is simply the inventory of space available and approved, or under construction, as of September 1, 1969. All capital cash flows after that date are determined as the difference between the total space needs according to formula and the allocation inventory, multiplied by the average unit cost of space.(20)

The unit cost multiplier was set at $55 per net assignable square foot, including furniture and equipment, in 1969-70 and to date has remained fixed at that value.

> It should also be noted that the capital formula has a "memory" in that it is simply cumulative, and capital entitlements not drawn remain available. Similarly, should capital entitlements be made available on the basis of projected enrolments which are not realized there will be a corresponding subsequent delay in future funding.(21)

Though the Committee on University Affairs urged that further development work be done on the capital formula following their recommendations in 1969, little was done for the next two years. The report of the consultants, expected in 1970, is now anticipated for April 1972. During this time, the Joint Capital Studies Committee indicated that it would willingly receive proposals for a capital formula from any interested parties. At the same time, recognizing that any capital formula would be primarily based on two inputs, space standards and cost, it directed the Capital Support Branch of DCU and the Research Division of COU to undertake studies in these two areas.

The Research Division of COU published a draft report in August, 1970 with comments and guidelines on space standards that might be incorporated into a formula.(22) The report also included commentary on what possible forms a capital formula might take. The Joint Capital Studies Committee and the Council of Ontario Universities tabled the draft report in October, 1970, but no further work was done on the document.

The building cost report, prepared by the Capital Support Branch of DCU, was presented to the Committee on University Affairs in December, 1970, and to the Joint Capital Studies Committee in early 1971. That report recommended to the Provincial Treasurer that the $55 cost multiplier not be altered for capital allocations in 1970-71.

To prepare for participation in deliberations on a final capital formula, the Committee on Capital Financing, with the approval of COU, opted to take action in the development of a proposal for a capital formula to be forwarded to the Joint Capital Studies Committee. The work was allocated to four task forces, all reporting to the Committee on Capital Financing. The Task Force - Space and Utilization was assigned the development of appropriate space standards. Programmes in Education and the Health Sciences were given special study by other groups. These programmes had not previously been included in the interim capital formula and CUA had indicated its desire to incorporate these programmes in its recommendations for capital support in 1971-72.

Therefore, two task forces were established to recommend interim formula weights and to serve as expert committees on the particular disciplines for the work of the Task Force - Space and Utilization. (These two task forces were known as the Task Force - Education (Capital) and the Task Force - Health Sciences (Capital).) The fourth task force, Task Force - Building Costs, was established to study and comment on the past costs and quality of university construction and to provide appropriate cost multipliers. The Department of Colleges and Universities was invited to send observers to all the task forces to keep informed of the work and to make suggestions on how the work might proceed. A reply was received only to the invitation to send a representative to the Task Force - Health Sciences (Capital) and in that case the invitation was accepted.

Once the decision on how to proceed had been made it became necessary to decide how the various task forces would be organized, who would be invited to serve and who would act as chairmen. The organization of the Task Force - Building Costs, the Task Force - Education (Capital), and the Task Force - Health Sciences (Capital) is covered in other reports.(23,24,25) The Committee on Capital Financing, in establishing the Task Force - Space and Utilization, sought to keep the working group to a minimum while at the same time ensuring that those universities on the task force represented the spectrum of activities at the Ontario universities. The Committee on Capital Financing identified eight variables for classifying activities at the various institutions:

(i) research grants as a percent of total budget (measure of research activity);

(ii) total FTE enrolment (scale);

(iii) part-time enrolment (headcount) as a percent of full-time enrolment;

(iv) full-time graduate enrolment as a percent of full-time undergraduate enrolment (graduate mix);

(v) undergraduate disciplines as a percent of graduate disciplines (programme mix);

(vi) age;

(vii) health science facility (yes or no?);

(viii) urban or suburban campus.

Three ranges were identified for the first six variables. Five universities were then selected which covered all ranges of these variables. Because the University of Toronto was unable to participate, the University of Western Ontario was chosen as representative of a large university. Each of the universities selected, Brock, Carleton, Guelph, McMaster, Western, was invited to name one representative to the task force. The chairman, and one additional member, were chosen from Queen's, a university not otherwise engaged in the study.

The Task Force first met on July 19, 1971, to define its task and to establish its procedures. By the time of its fifth meeting, August 30, the categories for a space classification scheme had been well defined, a list of potential input measures had been established, and the testing process had been clarified. The conclusion reached on procedure was that the individual test universities would not be required to test selected standards. Instead, they would provide data on space inventories, and required space, and data for a given list of potential input measures without relationship to the space categories. The Task Force would then complete the testing by matching an appropriate input measure and space standard for each space category on the basis of the data provided and the indicated relationships. Consideration would also be given to the need for comparability within the Ontario system and with other jurisdictions. This procedure was designed to give the Task Force a range of measures which would allow some flexibility both in the final choice of the space classification system and in the search for the best input measure (in terms of availability, measurability, and relevance) for each space category. It permitted the group to avoid the risks of making prior judgements on the best input measures and on the space standards within each category, providing instead the opportunity for reaching an informed judgement in each case. This would be based on all available information and on an understanding of the problems that emerged during the testing and analysis of the data.

The group recognized, at that time, that a formula which used more than one input measure could not be resolved into a simple, single equation of the form

$$\text{TOTAL FUNDS ALLOCATED} = \text{INPUT MEASURE} \times \text{SPACE PER UNIT} \times \text{UNIT COST}$$

This would serve only if a single input measure was found to be appropriate for all categories of space. This was not so, and while the results are somewhat more elaborate than a simple "macro" formula, the nine input measures selected appear to provide the best combination of indicators of required space.

2. REVIEW OF THE METHODOLOGY

2.1 Procedure

In later sections of this report the reader will have an opportunity to examine a detailed exposition of the assumptions and methodology that we followed. In its approach, it is essentially similar to space allocation formulae used in other jurisdictions outside Ontario. Like the others, there are problems inherent in the approach. In assessing any of these space allocation formulae it is important that the reader be clear in his own mind which of the problems he detects are due to the basic approaches of the formula itself, and which are due to the detailed application of the basic approach to the problems of Ontario universities. For example, the basic problems associated with the use of input measures are inherent in the methodology, while problems of the degree of variation from the selected standards may be the result of application of the method at an inadequate level of detail. In the selection of input measures and standards some form of averaging for the university system is introduced. The data from individual universities will, of course, vary from the averages. This variation can be limited to some degree by the level of detail at which the averaging process is applied, but it would be unrealistic to seek a level considered ideal for every institution.

Most reports on university space allocation give little consideration to the problem of basic approach. Yet we have seen during the course of our study that many of the criticisms one can make of these formulae in reality flow from their original premises. In this section we intend to look briefly at the concepts of space allocation.

Let us begin by recognizing that the Government of Ontario is the primary source of funds for both the Operating and Capital needs of Ontario universities. The various space allocation formulae proposed to them (including this one) are essentially methods of determining the "best" use of these funds in the public interest. The Capital grants problem can be seen as the series of steps set out below.

The Major Steps in Establishing a Capital Grant

1. Determine the "best" level of university plant and equipment for Ontario as a whole.

2. Determine that portion of the above which is best funded by the Government of Ontario, and that which is best funded by the private sector.

3. Determine the "best" allocation of the total funds between the various Ontario universities.

4. Develop a system which creates incentives for each university to make the best use of its capital funds.

Obviously, the critical problem is how one determines what "best" is. Every space allocation formula that we know of - including this one - starts by assuming that one should build a technological relationship between the number of persons or objects housed and the physical plant required to house them. Thus, for example, each Full-Time Equivalent Student is seen to use 'X' square feet of athletic space, bookstore space, classrooms, assembly areas, etc. Similarly, each staff member needs a given number of square feet of office space, and each library book requires a certain amount of space in the stacks.

If one accepts the technological approach, then disagreements involve: (1) what categories of physical plant should be recognized (e.g. how does one define a "classroom"); (2) which measures are to be used as proxies for space demand (the input measurement problem); (3) what conversion factor ought to be used (the space standard). Since this Committee had been instructed to follow an approach that was technological in its basic format, the reader will note that our lengthy deliberations followed essentially this three-step procedure.

However, a system for allocating scarce economic resources (the funds available to support higher education in Ontario) can never be entirely satisfactory if it is based on the technological approach described above. We think it important that the systematic nature of these problems be recognized, since it will help to anticipate some of the problems of implementation, and provide a rationale for recognizing when it is appropriate to up-date the formula.

To begin with, a grant system that separates Operating and Capital grants prevents a given university from effecting economies by making advantageous trade-offs between capital investments and operating costs. For example, it may make good economic sense for a university to rent some of its space instead of building its own. Yet, if it gets "free" capital grants for the building, and has to pay the rent out of its general operating budget, the "rational" decision the university should make seems clear - always build buildings if the capital grant is available. While such a rule presents a gross oversimplication it does illustrate a further dimension to the capital finance problem.

Secondly, the technological approach makes the implicit assumption that the essential methodology of operating a university will remain unchanged over time. That is, it views higher education as a process in which humans sit in rooms of various sizes and talk, experiment and read, within certain defined times of the day. One can reasonably expect this process to shift subtly over time, and a technological formula must have built into it a process for its own modification. For example, only fifteen years ago the demands created by language departments for laboratory areas would have been grossly underestimated. Even more troublesome, one suspects that over time some functions will need less space, and it is doubtful that the technological approach can readily accommodate this kind of situation.

Finally, it should be recognized that the technological approach is insensitive to the changing cost of scarce resources, and hence does not have its own self-adjusting mechanism to encourage their most efficient use. For example, the cost of handling a book in a library is, at the moment, cheaper than (a) providing a copy of the book to the student to keep for the length of the term, or (b) letting the student retrieve the contents of the book from computer memory and read it on some display device. It is not impossible, however, that the relative cost of these three alternative methods of letting the student do approximately the same thing may shift. For example, it may become cheaper to provide a copy of each book to every student, rather than incur the costs of operating a library for this purpose. In such a case, the space needs of the facility that dispenses books for long loan periods would likely be quite different from the present arrangement.

In case the reader thinks that these cautions are overdrawn - that the basic physical plant relationships for higher education are likely to stay stable over time - let him cast his mind back to 1960, and consider the impact of the following through the ten years to 1970: (a) the rapid growth of computer technology created a demand for additional physical space in addition to the existing conventional classroom and laboratory space, and the universities had to provide this space if they intended to keep teaching and research methods current; (b) the creation of cheap photocopying devices has permitted students to read at home sections of journals and books that they would otherwise have had to read at the library. This may lessen the demand for library reading room space. One could give other illustrations, but hopefully the point has been made - a capital grants scheme based on technological relationships has, by its nature, some inherent problems that cannot be eliminated. While using such a scheme, it is important that one keep in mind what these inherent problems are. Otherwise, one runs the risk of blaming a specific allocation plan - such as this one - for problems that are common to all.

At this point the reader is entitled to ask why we adopted the technological approach when it seemed to have such obvious faults. The frank answers are (1) the technological approach represents the best alternative as evidenced by its use in other jurisdictions; by using a roughly compatible approach we would be able to make useful cross-comparisons with work done elsewhere; (2) the Province had commissioned a major space study by an outside consulting firm that was known to be using a technological approach, and one of the possible consequences of our Committee's work might be thoughtful commentary on this study; (3) the preliminary studies prior to this Committee's appointment were based on a technological approach; (4) no better operational approach has been resolved.

When the Task Force first met in the summer of 1971 it had three basic tasks to perform. The first of these was to create definitions of physical space categories that would fit all campuses in the system and be exhaustive and mutually exclusive. It was agreed that in every case the amount of space in each category would be measured in square feet. Thus, for any given campus the space allocation scheme we sought to construct would provide both a detailed but not unduly long list of all types of campus physical facilities (.e.g. classroom, recreation, offices), and the number of square feet of each category that a campus "ought" to have. These "outputs" from our system are referred to as space categories, a term we will use through the rest of this report.

The next requirement was to decide which physical objects or persons were to be measured as proxies for the various demands on campus physical facilities, and which method was to be used to measure them (e.g. should one simply measure the number of students by counting the number that were enrolled, or make adjustments between those who were full-time and part-time?). These proxies became known as inputs, and this term will be used throughout the report.

Finally, the Task Force had to develop a procedure for selecting the input measure for each category, and determining the appropriate conversion factor. This was the problem of finding space standards. Thus, the basic notion of our space allocation scheme was that we identify and measure inputs, and convert them through standards into space categories as measured in square feet. Any study of this sort is inevitably a learning process, and the Task Force ultimately ended its study with a different perception of the problem from its initial one.

2.2 Space Classification Scheme

In the following paragraphs we shall describe for the reader the assumptions we had prior to our test of the five universities. The reader with a close technical interest in our studies will perhaps disagree with some of our later judgements, and it may be helpful if we indicate our preliminary views of the problem, and how they changed as the result of our tests.

Consider the problem of defining the space categories, since in many ways it proved to be the most manageable. In our opinion, the ideal classification scheme, in addition to providing an exhaustive and mutually exclusive listing of all campus physical facilities, should have the following positive features:

(1) It should be easily extended into a province-wide capital grants formula. This requires us to produce classifications that can be converted into costs per square foot. It is not necessary that every square foot of facility within that classification cost the same, but it is necessary that the average cost for a given facility not vary substantially from campus to campus at a given time.

(2) It should permit an understanding of inter-institutional comparisons. It might also be useful for internal purposes in each university. (We hesitate over this because of the reportedly perverse effects of using the operating grants formula, intended as an inter-university allocation device, for internal allocation within a given campus.) If it is used internally on a campus, the classifications should match the organizational structure of the institution in such a way that sub-organizations within the institution could be encouraged - or forced - by the system to make their own difficult allocation decisions of space within a total overall constraint.

(3) It should be technically "good" in the sense that the classifications chosen should match up naturally with input measures that are readily measurable.

(4) The elements of the system should not have a perverse "steering effect". It is a classic observation in designing control systems that are intended to control some aspect of human behaviour that the person being "controlled" soon learns to get much of what he wants, and he does so with behaviour which is not what the "controller" intended. For example, it is quite clear that the ultimate purpose of a capital grants scheme is to make the most effective use of public funds in the support of higher education. This will not be accomplished if the scheme induces a university to spend funds for a particular kind of space when some other kind would better suit its needs.

A steering effect is most powerful when the grant system reaches down into a given university and dictates what space of each kind must be provided. This has been referred to as the "micro" system of capital grants because it deals with the details of a given building. In contrast, the "macro" system of capital grants is like the present operating grant system, which makes a grant to the institution, and does not, in general, dictate the details of the manner in which it is to be spent.

The classification scheme that this Committee ultimately adopted is described in detail in Appendix C.

2.3 Input Measures

When it came to identifying possible input measures, we decided that the best strategy was to examine a greater number than we would probably want to use, and then to reject those which, in the test, showed themselves to be the least reliable predictors of space use, or which proved difficult to measure. We ultimately decided to try to develop measures for the following:

1. Weekly student contact hours;
2. Semester student contact hours;
3. Number of course registrations;
4. Full-Time Equivalent (FTE) student enrolment;
5. Classified headcount enrolment (graduate);
6. Classified headcount enrolment (undergraduate);
7. Classified full-time faculty;
8. Full-Time Equivalent (FTE) staff (both faculty and departmental support);
9. Equivalent volumes of books;
10. Number of library staff;
11. Total number of full-time staff;
12. Total area of campus buildings, excluding area set aside for central heating and chilling;
13. Full-time Equivalent Administrative Staff;
14. FTE Student Enrolment - in residences;
15. FTE Student Enrolment - not in residences.

The list above shows that in many cases we were trying to measure the same basic object in several different ways. For example, the FTE student measure counts a part-time student as only a fraction of an FTE (the fraction depending on the number of courses he takes), whereas a classified headcount enrolment counts part-time and full-time students as equivalents.

As a result of our testing, many of the above inputs were dropped because we could not find reliable ways of measuring them, or because the evidence failed to show a consistent relationship between the input and the space category under study. Detailed definitions of those inputs which we retained are found in Appendix H.

2.4 Space Standards

We turn now to the consideration of standards, or the conversion factors which convert inputs into outputs. There are a number of jurisdictions, particularly in the United States, which have established these standards, and we considered making a detailed examination of these prior to making our own field test, and from these, deriving a tentative set of our own standards for testing. We concluded, however, that a more effective procedure would be for the test universities to provide, on data sheets distributed by the Task Force, all data on available space by category, and statistics on the input measures selected for study by the group. Each test university was also asked to submit a second set of data sheets showing "required space" by category based on its best view of the space needed, at the existing input levels, to eliminate evident excesses or deficiencies. The Task Force felt that existing situations and circumstances were bound to embrace obvious discrepancies from a satisfactory norm, and that the reports on "required space" would be helpful in identifying anomalous situations in existing space allocation and use. A considerable number of excesses and deficiencies were revealed in the reports, and these required intensive examination.

Thus, equipped with a tentative set of inputs, classifications, and a methodology for evaluating proposed standards, the five test universities began their field work. As the information became available, the Task Force proceeded with its analysis and the development of conclusions and recommendations. The Task Force met during the data collection period to resolve uncertainties as to space category and input measure definitions and problems of data availability and measurement. The process of clarification and definition continued through the subsequent data review and analysis period.

The following section summarizes the conclusions and recommendations on space allocation. A detailed examination of procedures and findings is presented in Part II.

3. CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

It would be inappropriate for the recommendations of the Task Force to cover the full spectrum of the capital financing scheme. Several elements of the system properly lie within the jurisdiction of the individual universities while many others do not lend themselves to universal analysis. The space classification scheme (listed in Appendix C) was developed in view of these factors and outlines those elements of the physical plant for which the Task Force developed standards of space and utilization. As stated previously, areas associated directly with health science programmes have been excluded. Also omitted from consideration are residence space and provision for site services. Furthermore, the recommendations of the Task Force are not concerned with specific details of implementation or mechanism. In this regard no consideration has been made for the special problems inherent in an emerging institution.

The recommendations of the Task Force are summarized in Exhibit I. For each category of space in the classification scheme, the associated space standard and appropriate input measure have been identified. The total space allowance for a university may be calculated by inserting the input measures in the table, applying the space standard factors and summing the results.

As shown in Exhibit I, the space allocation formula classifies space into 15 categories (one of which is subdivided) and uses 9 input measures to serve as measures of need to apply to the space standards of the various categories. The definition of each factor and the justification for its selection are elaborated in Part II and the Appendices of this report. The specific recommendations from which Exhibit I has been constructed are set out in the categorical sub-divisions of Sections 6 to 10 inclusive.

The standards proposed are not directly comparable with the standards of the current interim formula, since the proposed system uses different input measures and a space classification formula to fit the needs of universities with various functional and programme emphases. Comparisons with the interim formula may be made in terms of aggregates when the necessary projections and calculations have been made for all universities. Space entitlement may be determined by comparisons with current space inventories. In making these tentative comparisons consideration must be given to the fact that the interim capital formula uses an enrolment weighting system which is said to give some unspecified weight to cost differences. If cost differences are to be introduced into the new capital formula, final comparisons should be deferred until the cost factors have been established.

The validity of the space formula rests more in the whole than in the parts. The standard for any given space category is unlikely to fit precisely the needs of any given university. For a given category it may provide something other than a very close fit for most universities, without invalidating the formula, but each standard should be reasonably close to an acceptable average if the formula is to produce satisfactory results. If the latter condition is met the formula will define, in total,

EXHIBIT 1

SPACE ALLOCATION FORMULA

Category #	SPACE (In Net Assignable Sq. Ft) =	STANDARD X	INPUT MEASURE
5.c	Library Service	3.2	Full-Time Equivalent Students
6	Athletic & Recreational	10.4	
8	Bookstore, etc.	1.8	
10	Office Space (not elsewhere classified) and Related Areas	8.9	
11	Academic Services	0.8	
12	Central Services	2.6	
13	Services to Students	0.3	
14	Common Use Space & Student Activity Space	6.2	
15	Assembly & Exhibition Facilities	2.4	
1	Classroom Facilities	.8 to 1.0	Student Non-Laboratory Contact Hours
2	Laboratory (Undergraduate)	8.5 - 5.2 -	Agricultural (Student Undergrad Non-Agricultural(Lab Contact Hours
3	Laboratory (Graduate & Faculty)	210.0	FTE Graduates & Full-Time Faculty of "Lab-Oriented" Disciplines only
4	Instructional Staff Offices & Related Space	243.0	FTE Faculty
5.a	Library Stack Space	.07 to .10	Equivalent Volumes
5.b	Library Reader (or study) Area	5.5 10.0	FTE Undergraduates & FTE Graduates
7	Food Service	7.5	Full Time Students
9	Maintenance Utility Space	.02	Gross Area

Definition of Terms: See Appendix H for definition of Inputs, and
Appendix C for definition of Outputs.

an acceptable level of building space for the university system as a whole, and should provide for a reasonably equitable and acceptable allocation of total space for each university within the system. Internal allocation of space should be left to each university so that it may be free to make variances from standard within its total allocation.

If any of the space standards in the formula deviates too far from an acceptable average, the universities with a greater or lesser share of their over-all activities in the functions represented by that category will be affected in ways which would not meet the test of reasonable equity insofar as that category is concerned, and in the total space allocation if that category is large.

It is the hope of the Task Force that the proposed standards may meet these tests. If it does not, the recommendations should, of course, be amended.

The Task Force considers that the standards presented are realistic and appropriate for the Ontario system. Some change from the present system total is to be expected when the results are aggregated, but the difference should be within manageable limits since the decision as to the standard for each category was made in the light of the existing situation at the five representative universities. Corrections were made, upward or downward, when differences between required space and actual space were justified by reference to appropriate utilization targets. Some problems may be generated for individual universities, and possibly for the whole system, when a new set of standards is injected into an established system. A process of phasing in may be desirable, but the need for this may best be determined when matters of formula space, non-formula space, costs, projections, space inventories and the manner and timing of funding are blended into a capital financing formula.

As explained in the Introduction, this report does not deal with the specific space requirements of the health sciences, but it does embrace the general university service space requirements of these disciplines. The same qualifications apply to the summary of the space allocation formula shown in Exhibit I.

The Task Force - Space and Utilization looks forward to the discussion which this report may stimulate, in the hope that it may foster a greater awareness of standards of space and utilization which are part of a capital grants formula.

REPORT OF THE
TASK FORCE - SPACE AND UTILIZATION
PART II

A DETAILED COMMENTARY

PART II

A DETAILED COMMENTARY

4. INTRODUCTION

Part I presented a brief description of the historical background and a general view of the approach and procedures adopted by the Task Force, together with a summary of its conclusions and recommendations.

Part II is directed towards a different purpose. It is hoped that the following sections may serve the needs of those interested in the specific details regarding the steps taken and conclusions reached by the Task Force. Chapter 5 provides a detailed discourse on the methodology, stating the definitions used and describing in detail the mechanisms of the data collection and analytical phases. Chapters 6 through 10 identify the space categories and provide an explanation of their derivation as well as a justification of the input measures and standards recommended by the Task Force. These sections draw extensively upon standards and inventory data of other jurisdictions and for this reason these data have been reproduced in Appendix A with references to their sources listed in the Bibliography. It should be noted that, because of their particular importance to the universities of Ontario related data and recommendations from the Ontario Universities Physical Resources Study conducted by Taylor, Lieberfeld and Heldman have been included although that report was not available in time for a thorough analysis by the Task Force.

In certain of the following chapters it will be observed that some problem areas and provocative questions, uncovered through the course of the study, remain unanswered. It is the hope of the members of the Task Force that additional efforts will be expended in these areas in the near future.

5. METHODOLOGY

Chapter 2 in discussing the procedure adopted by the Task Force attempted to identify the nature of caveats and compromises inherent in the technological approach. This chapter adopts a positive approach and documents for the interested reader the specific steps taken by the Task Force to allay some of the perceived apprehensions. In this chapter we shall explain why the Task Force followed its particular course of action.

5.1 Definitions

Certain useful definitions which were developed or adopted by the Task Force or are common to the university structure in Ontario may be identified. The first set of definitions refer to the general academic structure.

In order to satisfy the requirements for a degree a student must complete a programme of study. A programme then consists of a package of courses (classes or subjects) and/or research and/or field work. It is important to note that in effect students enrol in a programme of study, not in a particular department or faculty. Faculties and constituent departments provide services to programmes as do also the library or registrar's office. Departments and programmes may carry similar or identical titles (Department of History compared with the degree programme Bachelor of Arts with a history major). This common nomenclature arises because students in a programme often take the majority of their courses in the department of the same name.

To complete a programme each student must enrol in (and pass) a specified number of courses ("classes" or "subjects"). Thus a student enrolled in a Bachelor of Arts programme, majoring in history, might be required to take several specified history courses together with courses of his own choosing.

There are two methods of defining the teaching load imposed by any course: one based on the student time involved, and the other on staff time. As an example consider a course given by the staff of a department of Anthropology in which 200 students are enrolled. The course is divided into two sections and each section receives three hours of instruction per week. One measure of the teaching load is the student-contact hour (commonly referred to as the weekly student-contact hour and abbreviated to either SCH or WSCH). In this simple example there are 600 student-contact hours (200 x 3) since this represents the number of hours per week the students spend in the class summed over all registrations. The alternative measure is the number of staff-contact hours. This is the time spent by the staff conducting the course. Therefore, there are 6 staff-contact hours a week (2 sections times 3 hours per week) involved in this course.

The second set of definitions pertain directly to space planning. The following definitions are offered by Bareither and Schillinger:

> "Student Station: The total facilities necessary to accommodate one student for a given period of time, usually one hour. A student station may apply to a classroom, teaching laboratory, teaching gymnasium, music practice room, or other areas where a student is involved.
>
> Station Utilization: A percentage of student stations occupied when the room is in use. Some institutions use the term size ratio.
>
> Net Assignable Square Feet per Station: The number of square feet needed to accommodate one student in the particular subject field being evaluated. In this book, the square feet per station includes support areas such as preparation rooms, balance rooms, supply rooms, and so forth.

> Building Efficiency: The net assignable square feet in a building divided by the gross square feet.
>
> Field of Study: Denotes an academic department or interdisciplinary unit of the institution.
>
> Full-time Equivalent (FTE): A term to give the equivalence of the student body or staff of an institution on a full-time bases. It may have various values depending upon the manner in which it is defined. The exact definition and usage should be checked where any data involving an FTE are encountered." (10)

The University of the State of New York provided an excellent discourse of the differences between space standards, space factors and unit measurements:

> "What are space standards, space factors and unit measurements?
>
> First, a space standard is a common measurement which may be used to establish a goal for utilization, or allocation, of space. For example, a common standard for classroom space is square feet per student station--the number of square feet required to accommodate one student in a classroom. Another standard is the number of hours the room is scheduled for use. Still another standard is the percent of student stations used when the room is scheduled, sometimes called the class-size to room-size ratio. Other standards may relate space directly to a unit of people or activity, such as space per faculty or space per student or space per programme.
>
> Next, a space factor is a multiplier resulting from the interaction of standards used for a particular type of space. Thus, a space factor for a classroom can be derived by combining three standards--the square feet per student station, the hours per week the room is scheduled for use and the percent of student stations which are scheduled. The space factor is computed by dividing the assignable square feet per student station by the product of the number of hours the classroom is scheduled per week multiplied by the percentage of student stations scheduled when the classroom is scheduled.
>
> The third space measurement is a unit measurement and is expressed as area per person. The definitions of the areas and the persons used in this term can vary according to the preference of the institution and the end use of the term. The area may be either gross or net assignable square feet; the persons may be faculty or students, head-count or full-time equivalent (FTE).

> A number of ratios which conform to the definition of unit measurement may be computed from the facilities inventory data of any institution of higher education. The space standard of square feet per student station mentioned earlier is an example of unit measurement in its simplest form, net assignable square feet per student in a particular classroom. The total academic space of an institution--office, classroom, class laboratory and library--could be divided by the FTE student enrolment to find the academic unit measurement, and so on, recognizing space by category, department or organization.
>
> All three space measurements are used for projecting the needs for space. While each of the three has a distinct application in projecting space needs and in planning facilities for an institutional campus, the three measurements depend upon each other. That is, space standards shaped by institutional policy and characteristics are combined to produce a space factor which states the quantity of a type of space required for a unit of activity in that space. The space factor is used as a multiplier with a policy-determined standard of activity units per FTE student to compute the amount of one type of space needed per FTE student (unit measurement for one type of space). The summation of the unit measurements for each type of space or, by previous definition, the comprehensive unit measurement.
>
> To illustrate this, classroom standards of 15 net assignable square feet per student station, scheduled use of 30 hours per week, and 50% station utilization when scheduled produce a space factor of 1.00. [15/(30 x 0.5); this formula is discussed in the chapter on classroom facilities.] The 1.00 indicates that there is one net assignable square foot of classroom space required for every weekly student hour of teaching in classrooms, or the amount of space per unit activity. This space factor can in turn be converted into a unit measurement if the planner knows the average number of hours a student is scheduled in a classroom each week."(15)

The following definitions for gross area, net area and net assignable area are in common usage, and are quoted from Bareither and Schillinger.(10)

"1. Gross Area

The gross area of a building has been defined by the U.S. Department of Health, Education, and Welfare; the National Association of Physical Plant Administrators; the American Standards Association; the American Institute of Architects; and the National Academy of Sciences--National Research Council. These definitions are essentially the same. The major differences are the manner in which unenclosed roofed-over areas are evaluated. The two definitions of gross area most widely used by institutions of higher learning are those given by the American Institute of Architects and the National Academy of Sciences--National Research Council. Because of their extensive use, both definitions are given below:

The American Institute of Architects AIA Doc.D101
September 1963 Edition - Page 1
ARCHITECTURAL AREA OF BUILDINGS

The ARCHITECTURAL AREA of a building is the sum of the areas of the several floors of the building, including basements, mezzanine and intermediate floored tiers and penthouses of headroom height, measured from the exterior faces of exterior walls or from the center line of walls separating buildings.

Covered walkways, open roofed-over areas that are paved, porches and similar spaces shall have the architectural area multiplied by an area factor of 0.50.

The architectural area does not include such features as pipe trenches, exterior terraces or steps, chimneys, roof overhangs, etc.

Classification of Building Areas
Technical Report No. 50 for the Federal Construction Council
by Task Group T-56, Publication 1235
National Academy of Sciences--National Research Council,
Washington, D.C. 1964

Gross Area

a. Definition

"Gross Area" should be construed to mean the sum of the floor areas included within the outside faces of exterior walls for all stories, or areas, which have floor surfaces.

b. Basis for measurement

Gross area should be computed by measuring from the outside face of exterior walls, disregarding cornices, pilasters, buttresses, etc., which extend beyond the wall face.

c. Description

In addition to ground to top-story internal floored spaces obviously covered in "a" above, gross area should include basements (except unexcavated portions), attics, garages, enclosed porches, penthouses and mechanical equipment floors, lobbies, mezzanines, all balconies--inside or outside--utilized for operational functions, and corridors, provided they are within the outside face lines of the building. Roofed loading or shipping platforms should be included whether within or outside the exterior face lines of the building.

d. Limitations

Open courts and light wells, or portions of upper floors eliminated by rooms or lobbies which rise above single-floor ceiling height, should not be included in the gross area, nor should unenclosed roofed-over areas or floored surfaces with less than 6 feet 6 inches clear head-room be included unless they can properly be designated and used as either net assignable, mechanical, circulation, or custodial area.

The definition proposed in the report Classification of Building Areas is a result of a study conducted by a task group of specialists from nine federal government agencies and was published in 1964. Because of the recent issue of this report and probability that this definition will be used by all federal agencies and the majority of institutions in the future, it will be used throughout this book.

2. Net Assignable Area

There does not appear to be a great difference in this definition among the various organizations. The main differences found in the definition of net assignable area are in the terminology. Some schools use the term "net area" when they mean the same thing as "net assignable area". Other schools use "assignable area" when they mean the same thing as "net assignable area". To prevent any misconception of the term, the terminology "net assignable area" is used.

"Net assignable area", or net assignable square feet (NASF) as used in this text, is probably the most important area to be considered by the space analysts, as it is the amount of area which can be used by the occupants of the building. Because of the slight differences, the only definition of "net assignable area" given in this book is that proposed in Classification of Building Areas.

a. Definition

"Net Assignable Area" should be construed to mean the sum of all areas on all floors of a building assigned to, or available for assignment to, an occupant, including every type of space functionally usable by an occupant (excepting those spaces elsewhere separately defined--see 3, 4, and 5 below).

b. Basis for Measurement

All areas comprising the net assignable should be computed by measuring from the inside finish of permanent outer building walls, to the office side of corridors and/or to permanent partitions. (Some buildings are constructed to have two corridors on a floor, thus providing interior rooms. Under these conditions, the net assignable space of the rooms will be obtained by measuring from the inside surfaces of the enclosing walls.)

c. Description

Included should be space subdivisions for offices, file rooms, office storage rooms, etc., including those for special purposes (e.g., auditoriums, cafeterias, courtrooms, telephone and telegraph rooms, garages), which can be put to useful purposes in accomplishment of an agency mission.

d. Limitations

Deductions should not be made for columns and projections necessary to the building.

3. Custodial Area

The definition of custodial area differs little among the various agencies, and only that presented in Classification of Building Areas will be given in this manual.

a. Definition

"Custodial Area" should be construed to mean the sum of all areas on all floors of a building used for building protection, care, maintenance, and operation.

b. Basis for Measurement

These areas should be measured from the inside surfaces of enclosing walls.

c. Description

Included should be such [custodial] areas as guardrooms, shops, locker rooms, janitors' closets, maintenance storerooms.

d. Limitations

Deductions should not be made for columns and projections necessary to the building.

4. Circulation Area

The definition given below is that proposed in Classification of Building Areas.

a. Definition

"Circulation Area" should be construed to mean that portion of the gross area--whether or not enclosed by partitions--which is required for physical access to some subdivision of space.

b. Basis for Measurement

Circulation area should be computed by measuring from the inner faces of the walls or partitions which enclose horizontal spaces used for such purposes; or, when such spaces are not enclosed by walls or partitions, measurements should be taken from imaginary lines which conform as nearly as possible to the established circulation pattern of the building.

c. Description

Circulation areas should include, but not be limited to: corridors (access, public, service, also "phantom": for large unpartitioned areas); elevator shafts; escalators; fire towers or stairs; stairs and stair halls; loading platforms (except when required for operational reasons and, thus, includable in net assignable area); lobbies (elevator, entrance, public; also, public vestibules); tunnels and bridges (not mechanical).

d. Limitations

When assuming corridor areas, only horizontal spaces required for general access should be included--not aisles which are normally used only for circulation within offices or other working areas. Deductions should not be made for columns and projections necessary to the building.

5. Mechanical Area

The definition given is that proposed in Classification of Building Area. There may be some slight difference between this definition and that given by other agencies. Some agencies group the nonprivate toilet facilities, circulation areas, and custodial areas in the category of public service area. Thus, the definition used must be checked before any comparisons are made.

a. Definition

"Mechanical Area" should be construed to mean that portion of the gross area designed to house mechanical equipment, utility services and non-private toilet facilities.

b. Basis for Measurement

Mechanical area should be computed by measuring from the inner faces of the walls, partitions, or screens which enclose such area.

c. Description

Mechanical area should include, but not be limited to: air-duct shafts; boiler rooms; fixed mechanical and electrical equipment rooms; fuel rooms; mechanical service shafts; meter and communications closets; service chutes; stacks; and non-private toilet rooms (custodial and public).

d. Limitations

Deductions should not be made for columns and projections necessary to the building.

6. Construction Area

The definition given is that proposed in Classification of Building Areas. In essence, the construction is that area remaining after items 2, 3, 4, and 5 have been subtracted from gross area.

a. Definition

"Construction Area" should be construed to mean that portion of the gross area which cannot be put to use because of the presence of structural features of the building.

b. Basis for Measurement

Precise computation of construction area is not contemplated under these definition--some construction features are included in the computation of other areas. However, total construction area should generally be determined by assuming it to be the residual area after the net assignable, circulation, custodial, and mechanical areas have been subtracted from the gross area.

c. Description

Examples of areas normally classified as construction area are exterior walls, fire walls, permanent partitions and unusable areas in attics, basements, or comparable portions of the building.

7. Interior Area

This term, although not included in Classification of Building Areas, is used by some agencies and offices in analyzing the area used for exterior walls and other exterior projections on buildings.

a. Definition

"Interior Space Area" of a building means the total area measured between the principal exterior wall faces of the building. (Some agencies use interior space area of a building to mean the total area between the principal wall faces, at or near floor level, plus wallcase or alcove spaces, or both, opening into and designed to serve the activity carried on in that area. When this definition is applied to a building, it will result in the summation of the net assignable area, the custodial area, the circulation area and the mechanical area).

An example of the application of the various areas to a simple floor plan of a two-story building with a penthouse for mechanical equipment follows." (10)

5.2 Procedure

The Task Force first met on July 19, 1971. General terms of reference had been established by the Committee on Capital Financing prior to the establishment of the Task Force and these terms of reference gave a general indication of the approach that was to be followed by the Task Force. In chapter two we identified other approaches to the problems of facilities planning and the distribution of capital monies in addition to what we have identified as the technological approach. Since the intent in this section is to document what the Task Force did and not to expand on other methodologies beyond the exposition in chapter two it should be sufficient to state that because of constraints imposed by time, available data and resources for any commitment to researching other methods, the Task Force was faced with the necessity of adopting the technological approach.

The original terms of reference as established by the Committee on Capital Financing called for the Task Force to develop a space and utilization guide for the Ontario universities using as a base earlier work done by the Research Division of COU.(22) At the first meeting of the Task Force the terms of reference were altered slightly to specify that the output of the Task Force would be a space and utilization guide to be used as one of the inputs in the development of a capital formula. The revised terms of reference are included in Appendix B.

Two basic methods were considered by the Task Force. The first would involve researching the literature on space planning and selecting, by qualitative considerations, one set of space standards to apply to the test universities. Following the test the Task Force would analyze the results and make any necessary adjustments. The second approach, and the one eventually adopted, would involve collecting data on a uniform basis from the test universities on available and required space by defined categories and on certain measures of each university's operation (students, staff, library volumes, etc.). These measures were termed input measures by the Task Force. The input measures would then be analyzed with the various space factors or statistics. These factors would, in turn, be compared with data from other jurisdictions. From this comparison the Task Force would frame their recommendations for the space and utilization guide.

This second method was considered superior since the first assumes a priori that the input measure used for a given space standard is the most appropriate. A survey of the current literature is sufficient to illustrate that various input measures are often used to determine the requirements for space in any one category - both student enrolment and student contact hours, for example, are used to determine classroom space. Since the Task Force did not wish to be committed to a specific input measure without further study the second approach was selected.

This decision necessitated further exploration of two aspects which became the subject matter of all meetings through to September, 1971. These were the identification and definition of all relevant input measures and the classification of all assignable space. The space classification scheme received the first priority on the agenda of the Task Force.

Taylor, Lieberfeld and Heldman had introduced a space classification scheme for the Ontario universities in 1967 as a first step in the physical resources survey commissioned in that year. This classification scheme was available to the Task Force and naturally was a strong contender for adoption. There were however several drawbacks. One serious deficiency was the lack of definitions associated with the space categories, leaving many areas to be assigned to categories according to the interpretation of individual universities. Therefore, inaccuracies could result through comparisons of data between universities if the Task Force had adopted the Taylor, Lieberfeld and Heldman space classification scheme.

Several universities reported that it had been necessary to alter the TLH space categories in order to make them useful for internal facilities planning. One of the purposes of our endeavour was to produce a guide helpful for facilities planning and this objective received due consideration when it became necessary to decide upon a space classification scheme.

The Task Force also considered the classification schemes now used at several Ontario universities, these being modifications of the Taylor, Lieberfeld and Heldman scheme. In addition classifications of space by the Western Interstate Commission on Higher Education (WICHE) and the Department of Health, Education and Welfare (HEW) in the United States were also considered. The classifications introduced by WICHE did not contain any definitions but merely included lists of areas within major space categories. HEW on the other hand, having considerable expertise in this area, has produced exhaustive definitions for each space category.

The Task Force convened on July 30, 1971 to adopt one of the developed classification schemes or one modified to suit the Ontario university system, considering the criteria that categories should:

(1) be exhaustive and mutually exclusive
(2) meet the requirements of a provincial formula
(3) be useful for internal purposes
(4) reduce the error in inter-institutional comparisons
(5) be compatible with selected input measures
(6) reduce any steering effect
(7) match as closely as possible the structure of the university areas of responsibility

Though no single space classification scheme matches all these criteria the categories suggested by HEW more closely suited the needs of the Task Force. The Task Force made several modifications to the HEW categories, particularly the office category and arrived at the following categories:

(1) classroom (lecture, seminar and tutorial)
(2) laboratories (undergraduate)
(3) laboratories (graduate and faculty)
(4) instructional staff offices and related space
(5) library
(6) athletics and recreational athletic space
(7) food service
(8) book store
(9) maintenance
(10) other office and related space
(11) academic services
(12) central services
(13) services to students
(14) student activity and common use space
(15) assembly and exhibition facilities
(16) non-assignable areas
(17) areas not included in recommendations of Task Force

Definitions for all categories are included in Appendix C together with the associated code numbers from the Taylor, Lieberfeld and Heldman scheme where such a match was possible.

The next step was to determine all the possible input measures to match the space categories. The technological approach assumes that the need for a particular space category can be associated with some objective measurement. With respect to classroom space, for example, the Task Force identified the following factors thought to influence the total need for this type of facility.

(1) weekly student non-laboratory contact hours
(2) semester student non-laboratory contact hours
(3) course registrations
(4) full-time equivalent enrolment
(5) full-time enrolment

In evaluating this list of possible input measures, the Task Force considered the following criteria:

(1) the data for the input measure should be readily available
(2) the functional relationship of the input measure and the space category should be expected to remain applicable in the immediate future
(3) for any space category the potential input measures should be essentially independent
(4) the input measures should exhibit some similarity with those of other jurisdictions making some comparison possible.

Using these criteria for the above list of possible input measures for classroom space, semester student non-laboratory contact hours and course registrations were deleted because they seemed to parallel weekly student non-laboratory contact hours and full-time enrolment respectively.

In this way, potential input measures were identified for each space category and evaluated in terms of the above criteria. From this procedure the Task Force selected the following input measures on which to collect data:

(1) weekly student non-laboratory contact hours
(2) weekly student laboratory contact hours by department
(3) full-time enrolment
  - graduate
  - undergraduate
(4) full-time equivalent enrolment
  - graduate
  - undergraduate
(5) full-time faculty by department
(6) headcount of part-time faculty by department
(7) full-time equivalent of part-time faculty by department
(8) full-time library staff
(9) full-time equivalent of all other staff
(10) equivalent library volumes
(11) gross area of the university
(12) hours of operation of the university
  - day
  - evening

5.3 Data Collection and Analysis

The Task Force agreed that data would be submitted by the five universities on all input measures for the academic year 1970-71. Two sets of data on space were submitted. The first was a compilation, by space category, of all available space at each of the test universities. The second was a similar compilation except that instead of available space the universities indicated what the required space would be for each category given that the operation of the university as defined by the input measures remained fixed. The reasons for requesting the data on required space were extremely important in the decision-making phase of the project. There are many cases of university departments being housed in old, unsuitable buildings - offices, for example, of 150 square feet but with solid stone walls, making satisfactory renovation impractical. Sometimes university departments are crowded into inadequate space on a make-do basis. Examination of these situations can be useful for space planning, but misleading if the current statistics become models for space standards. The reverse situation can also occur. Departments are sometimes accommodated in new buildings with provision made for growth. Therefore standards based on statistics from this situation would produce over-estimates of requirements if applied to another department.

The Task Force hoped to meet these problems by reference to estimates of required space collected on the second set of data forms.

Representatives of the test universities agreed to complete the data forms during September, 1971. The Task Force met once during that month to resolve problems that had arisen during the data collection. The forms were then amended to reflect these changes. A complete set of data collection forms has been included in Appendix F. These forms contain many of the definitions for the input measures.

The completed forms were forwarded to the Research Division of COU for analysis during the first week of October. The steps followed at the analysis stage are best described by following through an example - instructional staff offices. The first step was to ascertain which input measures logically determine the space required for instructional staff offices and to list the input measures used by other jurisdictions. For this category, which includes academic staff offices, department secretarial offices, graduate student offices, conference facilities and related service areas, the Task Force identified the following input measures to be matched against the space in this category:

(1) full-time equivalent students
(2) full-time academic staff (by department)
(3) full-time equivalent academic staff (by department)

Tables were then prepared comparing the results of matching the input measures and the available and required space with data from other jurisdictions. These analyses, done for all space categories, were completed during the weeks of October, 1971.

5.4 Decision-Making Process

The Task Force met several times during October and November, often for two day meetings, in an attempt to reach agreement on proposed space standards for a capital formula. In several cases it was necessary to choose between input measures used by other jurisdictions and input measures which appear more suitable for the Ontario university system. For other space categories the selection of the input measure was more obvious but debate to reach an agreement on a possible value more lively.

Certain categories required further study and definition. From the analyses it was determined that the test universities had not categorized all space in the same manner and it became necessary to correct several of the tables. Some input measures also required revision. During the discussions changes were made in some of the estimates of required space, in view of estimates made by other participating universities and data from other jurisdictions. When confronted with these data the test universities recognized that their estimates of required space in certain categories and for certain departments were too high and that other estimates were insufficient.

By mid-November, the Task Force had agreed on recommendations for all categories of space. The following chapters are devoted to detailed commentary on each space category and provide explanations of the subsequent recommendations.

6. INSTRUCTIONAL SPACE

6.1 Classroom Space

Included in this category are all classroom areas such as lecture, seminar and tutorial rooms and all related service areas. A complete description of this category is found in Appendix C.

In their preliminary report to the Joint Capital Studies Committee Taylor, Lieberfeld and Heldman(1) recommended a standard for classroom space of 10 square feet per full-time equivalent student. A survey of planning standards in twenty-seven states, prepared by the Bureau of Higher Education of the State Education Department of New York, reported that only two states, Florida and New Jersey, used planning standards for classroom space based on a student enrolment count.(6) (Several other states reported their inventory of classroom space on the basis of square feet per full-time equivalent student - Table 1.) The standard for Florida was reported at 10.1 square feet per full-time equivalent student and that for New Jersey at 10.8 to 13.0 square feet per full-time student, depending on the type of university (Education, Engineering, or Liberal Arts). Standards for classroom space reported by the remaining states were based on square feet per student contact hour. The standard was dependent on hours of operation per week, utilization rates and an architectural building standard of square feet per station.

In 1967-68 the Ontario Universities (excluding the University of Toronto) had an average of 20.4 square feet of classroom space, including service area, per full-time equivalent student.(1) This average dropped to 19.0 in 1968-69. The spread in those two years however was significant ranging from 13.0 to 35.8 in 1967-68 and from 10.3 to 41.8 in 1968-69. The average for the five test universities represented on the Task Force was 13.4 for the academic year 1970-71 while the range varied from 10.0 to 16.4. These same universities however indicated a requirement, on average, of 12.7 square feet per full-time equivalent student (Table 1).

Though it would appear that some form of student count, whether that be full-time or full-time equivalent enrolment, would be an appropriate input measure for determining classroom space needs, it can be demonstrated quite clearly that these measures could lead to erroneous conclusions. Though no study has been done in Ontario with the specific object of determining how many part-time students attend courses during the evenings and how many attend regular daytime classes together with the full-time students, the Research Division of the Council of Ontario Universities did conduct a survey of the utilization of physical resources during 1971, the data to be used in the preparation of a report on the feasibility of a year-round calendar system. Part of this survey dealt with the enrolment of part-time students in evening courses. From the data received (ten universities)

TABLE 1

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE(3)

Square Feet per Full-time Equivalent Student

	Test Universities(2)		Other Jurisdictions(1)		Taylor, Lieberfeld and Heldman(2)			Task Force Recommendation
	Available	Required	Standard	Inventory	1967-68	1968-69	Recommendation	
RANGE	10.0 - 16.4	8.6 - 18.3	10.1 - 13.0	9.1 - 24.6	13.0 - 35.8	10.3 - 41.8	-	The Task Force recommended that this input measure be avoided if at all possible in determining required classroom facilities
ADJUSTED RANGE(4)	-	-	-	-	-	-	-	
WEIGHTED AVERAGE	13.4	12.7	-	-	20.4	19.0	10.0	

1. not known if service facilities are included.
2. includes service facilities
3. standards and inventory data from the external jurisdictions are listed in Table 1a of Appendix A.
4. two upper and two lower values are deleted from the range (reported if at least 5 data points).

it appears that almost 100% of all part-time students attend courses held in the evening. Therefore if we postulate that an institution with a significant commitment to part-time enrolment can utilize classroom space built to accommodate the full-time students then a planning standard based on full-time equivalent enrolment will clearly favour that institution with a significant commitment to part-time programmes.

Consider two of the test universities. One institution had a full-time equivalent (FTE) enrolment of approximately 10,000 in 1970-71; the other an FTE enrolment of about 7,000. Based on a full-time equivalent student count the larger university shows a requirement of 12.3 square feet per FTE student and the smaller university 14.5. However, if the space factor was based on full-time enrolment then the university of 10,000 would require 15.5 square feet per full-time student while the smaller institution would require only 15.8 square feet per full-time student. Further study of the enrolment data shows that 24% of the full-time equivalent enrolment at the larger university are enrolled in part-time studies whereas part-time students comprise only 2% of the full-time equivalent enrolment at the smaller university.

There are additional factors imbedded in a standard based on full-time equivalent students which the Task Force feels should be quantifiable if the standard is to be meaningful as part of a formula to be used in a planning context. For example, the Taylor, Lieberfeld and Heldman standard of 10 square feet per full-time equivalent student weighs undergraduate and graduate full-time equivalent students equally. Obviously some averaging mechanism is implied, but in assessing a curriculum change the impact on classroom facilities ought to be evaluated by something better than a standard based upon full-time equivalent students. A further example is that there is some measure of utilization of these facilities implied in such a standard. It is not a statement of inefficient use of resources to acknowledge that a combined room and seat utilization of less than 100% is a maximum attainable rate in a university. It is quite common for a university to schedule classes of thirty in a room capable of holding fifty or even one hundred because there is no smaller classroom available. Perhaps the suggestion by Taylor, Lieberfeld and Heldman that a greater emphasis be placed on remodelling and renovating the available facilities is valid, but it must still be admitted the current mix of classroom will seldom, if ever, approximate the optimal mix. Just as there is a trend toward more seminar and tutorial patterns of instruction, other changes may occur with important effects upon the mix of classroom areas. Changes in the patterns do not generally take place at a single point in time but more closely resemble an evolutionary process which can be accommodated by renovation and/or new construction. Inherent in such an adaptation to new needs is some time lag with the result that it is clearly not possible to utilize facilities at the optimum level of efficiency.

Furthermore, different programmes have different demands for classroom facilities, and a standard based on student enrolment implies some given mix of programme enrolment. The Task Force feels that it is incorrect to assume that all these factors should be hidden in one all-inclusive standard and therefore rejects the use of full-time equivalent enrolment as an input measure for this category, especially since a better indicator is available.

As mentioned previously the more generally used standard for planning classroom space is based on the number of square feet required for each student-hour spent in lectures, seminars and tutorials (better known as the student contact hour (SCH) or the weekly student contact hour (WSCH) - these terms are synonomous). The standard is based on four factors: square feet per station, hours of operation per week of the institution, room utilization, and seat utilization while the room is in use.

$$\begin{array}{c}\text{SQUARE FEET}\\ \text{PER STUDENT}\\ \text{CONTACT HOUR}\end{array} = \frac{\text{SQUARE FEET PER STATION}}{\begin{array}{c}\text{HOURS OF}\\ \text{OPERATION}\\ \text{PER WEEK}\end{array} \times \begin{array}{c}\text{ROOM}\\ \text{UTILIZATION}\\ \text{RATE}\end{array} \times \begin{array}{c}\text{SEAT}\\ \text{UTILIZATION}\\ \text{RATE}\end{array}}$$

Two of the factors, hours of operation per week of the institution and room utilization rate, are sometimes combined into a single factor - weekly scheduled hours of operation. Alternately the terms room utilization rate and seat utilization rate are combined into a factor called the capacity utilization coefficient.

We shall first discuss the factor, square feet per station. Data collected from the five test universities for the academic year 1970-71 showed an average of 15.3 available square feet per station including service facilities with a range of 12.7 to 16.2 square feet. Comparable data was not made available in the Taylor, Lieberfeld and Heldman report so no comparisons can be made to the prevailing situation in 1967-68 or 1968-69.

In 1957 the United States Department of Health, Education and Welfare reported the mean area per student station in all public universities at 15.4 and the mean for private institutions at 15.1. These figures include "any ancillary area devoted exclusively to the functions of the classroom".(13) New York State in its survey of 27 states reported that at least 19 states used planning methods for classroom space based on square feet per student contact hour and of these 15 reported standards for student stations ranging from 14.0 to 16.5 square feet per student station.(6) Unfortunately it was not indicated whether the space standards included or excluded service space for classrooms. The Western Interstate Commission for Higher Education (WICHE) in its field review edition, Higher Education Facilities Planning and Management Manuals, proposed a value of 17.5 square feet per station including the attendant service facilities.(3)

These factors represent objectives for the various state systems and in several cases differ markedly from the current achievement. In the New York State study only three states reported their inventory in terms of square feet per student station and these varied from 14.5 to 16.3, comparable to the range of planning standards (the conclusion is somewhat uncertain since only a limited number reported actual inventory). Indiana State did not report actual utilization in the New York State survey of 1970 but did publish data on Indiana State institutions in 1967.(11) At that time the area per station varied from 11.6 for lecture rooms to 19.0 for seminar rooms and averaged 14.6, all figures being exclusive of service space.

Several institutions have incorporated a scale factor into the term square feet per station. The range for Indiana varies from 17 square feet per station for those institutions with less than 10,000 student contact hours to 14 square feet per station for institutions with more than 100,000 student contact hours. The variation for New York institutions is based on the degree level, 17 square feet at the associate degree level, 16 at the baccalaureate and masters level and 15 at the doctoral level. Following careful deliberation the members of the Task Force agreed that the average value required for the factor, square feet per station, was dependent on the mix of room sizes and is usually planned to meet the particular academic programme of a university. The Task Force agreed that an average value should be set for this factor, and established the value at 15 square feet per station, including service facilities (Table 2).

The standard is based on an allowance of 14 square feet per station for the lecture, seminar and tutorial rooms and 1 square foot per station for service facilities. These factors represent averages since the acceptable space standards for seminar and tutorial rooms range from 18 to 20 square feet per station while area allowances for lecture rooms tend to be less than 14 square feet. The Task Force agreed that the standard of 15 square feet per station should provide for the various classroom sizes required.

The second term in the expression refers to the weekly hours of operation of the university. In Ontario this can vary from 40 hours per week to over 80 hours per week depending largely on the part-time or extension programme offered by the institution. The Task Force held the opinion that just as a recommendation for a standard based on the number of square feet per full-time equivalent student would be prejudicial because of the effects of the types of programme carried on at an institution, whether that be a commitment to part-time programmes or not, so any recommendation dependent specifically upon the hours of operation per week at an institution would also be prejudicial toward some institutions.

TABLE 2

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE (3)

Square Feet per Station

	Test Universities(1)		Other Jurisdictions(2)		Taylor, Lieberfeld and Heldman			Task Force Recommendation(1)
	Available	Required	Standard	Inventory	1967-68	1968-69	Recommendations	
RANGE	12.7 - 16.2	N.A.	9.0 - 20.0	12.0 - 16.3	N.A.	N.A.	N.A.	
ADJUSTED RANGE(4)	-		10.0 - 18.0	-				
WEIGHTED AVERAGE	15.3		-	-				15.0

1. includes service space
2. only some of the standards are known to include service space
3. standards and inventory data from the external jurisdictions are listed in Table 2a of Appendix A
4. two upper and two lower values are deleted from the range (reported if at least 5 data points).

Therefore, the Task Force does not make a recommendation based on the hours of operation of an institution. However, in order to derive a recommended standard for the space factor, square feet per student contact hour, it was necessary to adopt a data base for the weekly hours of operation and a time span of 45 hours per week was selected. This value is a base only and is not used nor proposed as a standard either for an institution or for the Ontario university system.

The room utilization parameter is a measure of how many hours the average room is in use during a typical week. For example, if an institution operates on a 45 hour week and room use averages 30 hours per week, it achieves an average room utilization of 66%. The seat utilization parameter is a measure of seat occupancy during scheduled classroom hours. As indicated previously the room and seat utilization parameters are often combined into a single term, the capacity utilization coefficient. Thus, a room utilization rate of 60% and a seat utilization rate of 70% would convert to a capacity utilization coefficient of 42% (60 x 70). The interpretation of a capacity utilization coefficient of 42% is that each seat is occupied on average for 42% of the teaching week or for approximately 20 hours in a 45 hour teaching week (45 x .42).

The capacity utilization coefficients at the five test universities ranged from 24 to 33% in 1970-71. Based on an estimate of required classroom space the capacity utilization coefficients would vary from 22 to 38%. Taylor, Lieberfeld and Heldman reported that the capacity utilization coefficient averaged 21% for 13 Ontario universities (the University of Toronto was excluded) in 1967-68 and varied from 8% to 36%. These coefficient values are not, by themselves, indicative of an inefficient use of resources since the utilization rates were measured over different time periods (variation was 35 to 84 hours per week). Scheduling 100,000 student contact hours over a 65 hour week will result in a lower utilization rate than the same 100,000 hours scheduled over a 45 hour week. This obvious fact is often overlooked in comparisons of the reported utilization rates of various jurisdictions.

In the New York survey eighteen states reported standards on seat utilization and weekly scheduled hours. The seat utilization standards varied from 50 to 67%. The standards on weekly scheduled hours ranged from 30 to 34 hours with the majority of states using the factor of 30 hours. If the university was open 60 hours a week for regularly scheduled classes then the standard of 30 hours represents an effective room utilization rate of 50% whereas if the university were open only 40 hours for regularly scheduled classes the standard of 30 hours would represent a room utilization rate of 75%.

Without knowledge of the room utilization standards of the States in that survey it is impossible to derive actual capacity utilization coefficients for comparison with the Ontario universities. Approximations can be made however by assuming that the standards are based on a 45 hour week and converting the reported weekly scheduled hours standard to a room utilization standard based on 45 hours of operation per week. Thus, a standard of 30 hours per week would convert to a room utilization rate of 66%. Where possible all standards from other jurisdictions were normalized in this manner to a 45 hour week. However, it must be remembered that these normalized standards assume measurement over a 45 hour week.

For example, the standards for Illinois are stated as

Scheduled hours of use per week	30
Seat utilization rate	60%
Square feet per station	15

Assuming that the scheduled hours per week correspond to forty-five hours of operation, a normalized capacity utilization coefficient can be calculated.

$$\text{CAPACITY UTILIZATION COEFFICIENT} = \frac{\text{WEEKLY SCHEDULED HOURS}}{\text{WEEKLY HOURS OF OPERATION}} \times \text{SEAT UTILIZATION RATE}$$

$$= \frac{30}{45} \times 0.60$$

$$= .40$$

The normalized capacity utilization coefficients for other jurisdictions are presented in Table 3 along with the data for the test universities.

The majority of jurisdictions and publications quote standards for the utilization parameters which are averages for the specific system. However, it is unreasonable to expect an institution of 5,000 students to achieve the same utilization of classroom facilities as an institution of 15,000 students. Recognizing this several jurisdictions have adopted standards for the utilization rates which vary depending either on the type of institution (New York State) or the total full-time equivalent enrolment (Oklahoma). Table 3b in Appendix A lists the standards used by jurisdictions which use a sliding scale for the utilization parameters. Once again for comparative purposes the weekly scheduled hours and seat utilization rates have been converted to capacity utilization coefficients based on a 45 hour week.

TABLE 3

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE(3)

Capacity Utilization Coefficient

Except where noted all data from other jurisdictions have been normalized to a 45 hour week.

	Test Universities		Other Jurisdictions		Taylor, Lieberfeld and Heldman(1)			Task Force
	Available	Required	Standard	Inventory	1967-68	1968-69	Recommendations	Recommendation
RANGE	24 - 33	22 - 38(1)	33 - 50	16 - 43	8 - 36	-	-	
ADJUSTED RANGE(4)	-	-	40 - 44	29 - 33	-	-	-	
WEIGHTED AVERAGE	-	-	-	-	21	-	-	
OTHER	28 - 33(2)	31 - 33(2)	-	-	-	-	-	

NOTE: The Task Force agreed upon a sliding scale for this factor, measured as a function of total student contact hours.

1. capacity utilization coefficients measured over varying time periods, from 35 to 84 hours per week.
2. data only for those universities operating on a 45 hour week.
3. standards and inventory data from the external jurisdications are listed in Table 3a of Appendix A.
4. two upper and two lower values are deleted from the range (reported if at least 5 data points).

Members of the Task Force agreed that a sliding scale should be adopted, instead of a single value, for the Ontario university system but they rejected the use of a scale based either on full-time equivalent enrolment or the type of institution. Defining universities by "type" such as junior colleges, baccalaureate or doctoral institutions is definitely not an appropriate approach for the Ontario universities. Nor is equating utilization to size as measured by the full-time equivalent enrolment. A wide variation in the number of hours the average student spends in lectures, seminars, and tutorials can exist from university to university. The five test universities showed a variation of from 11.8 to 14.2 hours per student.

Instead the Task Force agreed that student contact hours provided a better measure of the requirements for classroom facilities and therefore established three ranges: 0 to 40,000, 40,000 to 80,000 and over 80,000 student contact hours. In consideration of the data and the view that present utilization leaves some room for improvement, the following capacity utilization coefficients were agreed upon, based on the teaching within a 45 hour week:

STUDENT CONTACT HOURS	CAPACITY UTILIZATION COEFFICIENT
first 40,000	33
at 80,000	35
Maximum	40

TABLE 4

One question that might be raised as a result of this commentary is whether or not a trade-off exists between the hours of operation per week and the utilization parameters. With the total contact hours remaining constant, as the hours of operation increase the room utilization rate naturally decreases. Should the seat utilization parameter increase or decrease? Since all the rooms are available for scheduling in the evening and the teaching demand as measured by student contact hours is less than that for the regular daytime programmes one might expect the seat utilization for the rooms used to increase during the evening courses. Available evidence however does not support this. Indiana State reported lower seat utilization rates in the evening hours for all campuses except those with less than 500 students.(6) Ohio State reported evening utilization rates only for the two year branch campuses.(2) Of the 19 campuses only 6 reported increases in seat utilization during the evening hours. In the evening the greater relative supply of classrooms permits freer choice to serve preferences for convenience, accessibility, proximity, etc.

The final step in deriving a standard for classroom space based on square feet per student contact hour is to substitute the recommended values for the various parameters in the expression:

$$\text{SQUARE FEET PER STUDENT CONTACT HOUR} = \frac{\text{SQUARE FEET PER STATION}}{\text{WEEKLY HOURS OF OPERATION} \times \text{CAPACITY UTILIZATION COEFFICIENT}}$$

The result is the following table of values:

TOTAL STUDENT CONTACT HOURS	SQUARE FEET PER STATION	WEEKLY HOURS OF OPERATION	MAXIMUM EXPECTED CAPACITY UTILIZATION COEFFICIENT	SQUARE FEET PER STUDENT CONTACT HOUR
first 40,000	15	45	33	1.0
second 40,000	15	45	35	.9
over 80,000	15	45	40	.8

TABLE 5

Comparative values from other jurisdictions are listed in Table 6.

The reasons for proposing student contact hours as the input measure for this category rather than some form of student count have already been discussed. Also, the choice of the factor of 15 square feet per station has been documented. The value is within the limits planned by other jurisdictions, especially since service space is included, and is within the capacity of the Ontario universities to achieve. Some further comments on the other recommendations are in order.

We indicated previously that a base value for the term weekly hours of operation, 45 hours, was introduced to attempt to normalize the capacity utilization coefficients in other jurisdictions for comparison with the five test universities. A university operating on a 65 hour week should not be able to apply all the student hours in the 65 hours to a space factor based on utilization rates measured over a 45 hour week. Conversely, it is not valid to apply a factor based on a 65 hour week to teaching done over a 45 hour week. Therefore a base period, 45 hours, was adopted over which to measure utilization rates and to develop a space standard to apply to teaching over the same time period.

The scale of values for the capacity coefficients proposed by the Task Force appear to be considerably lower than the standards put forward by other jurisdictions. However, it is the opinion of the members of the Task Force that the standards from the other jurisdictions are unrealistic. This conclusion is supported in part by a comparison of the utilization standards and the actual utilization rates achieved in the same jurisdictions; the latter are uniformly lower than the standards. The current capacity utilization coefficients at the five test universities are comparable to the same coefficients in other jurisdictions. In the other jurisdictions the inventory of square feet per student contact hour is also uniformly higher than their proposed standards (see Table 6).

Members of the Task Force believe that some improvement is possible in the utilization rates at the Ontario universities and their aspirations are reflected in the recommended utilization standards which are significantly higher than those currently being achieved (yet more realistic than the standards proposed in some jurisdictions). If the recommendation to introduce student contact hours as the input measure in determining classroom space is accepted then interim values should be established for the capacity utilization coefficients since it is unlikely that the Ontario universities can meet immediately the goals established by the Task Force.

A comment is also in order regarding the feasibility of reporting total student contact hours. Universities collect data on the present number of student contact hours for completion of the report of section sizes to the Committee on University Affairs. The question, therefore, is whether or not projections can be made of this data. It is the opinion of the Task Force that knowledge of the projected teaching demand in any department is as important in the planning of that department or faculty as the number of students and their distribution into the various programmes. For adequate planning to be accomplished there must be some recognition of the number of hours students will spend in classes.

For classroom space, cognizant of the planning standards and actual inventory and utilization rates in other jurisdictions together with the data for available and required classroom space in the five Ontario test universities, the Task Force recommends that:

1. THE SPACE TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 1 OF APPENDIX C OF THIS REPORT.

2. STUDENT NON-LABORATORY CONTACT HOURS BE ACCEPTED AS THE INPUT MEASURE FOR DETERMINING SPACE REQUIREMENTS IN THIS CATEGORY.

3. STUDENT NON-LABORATORY CONTACT HOURS ELIGIBLE FOR COUNTING IN THIS CATEGORY MEET THE FOLLOWING REQUIREMENTS:

   (i) THEY SHALL OCCUR WITHIN A 45 HOUR WEEK, CONSISTING OF 5 or 6 BLOCKS OF CONSECUTIVE HOURS AND SUCH THAT EACH BLOCK IS NOT TO EXCEED 9 HOURS.

   (ii) THEY SHALL BE RECORDED FOR A FULL WEEK IDENTIFIED BY EACH UNIVERSITY BUT NOT TO PRECEDE THE LAST DAY ON WHICH COURSE CHANGES ARE ALLOWED

4. STANDARDS FOR THE SPACE FACTOR, SQUARE FEET PER STUDENT NON-LABORATORY CONTACT HOUR, BE BASED ON THE FOLLOWING SCALE:

TABLE 6

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE

Square Feet per Student Non-Laboratory Contact Hour

	Test Universities(1)		Other Jurisdictions(2)		Taylor, Lieberfeld and Heldman			Task Force
	Available	Required	Standard	Inventory	1967-68	1968-69	Recommendation	Recommendation
RANGE	0.74 - 1.23	0.66 - 1.28	0.44 - 1.07	0.74 - 2.02	-	-	-	Recommend a range of values as a function of total student contact hours.
ADJUSTED RANGE(3)	-	-	0.60 - 1.00	-				
WEIGHTED AVERAGE	1.00	0.95	-	-				

1. based on differing teaching weeks.
2. standards and inventory data from the external jurisdictions are listed in Tables 6a, 6b and 6c of Appendix A.
3. two upper and two lower values are deleted from the range (reported if at least 5 data points).

Total Student Contact Hours Per Week	Square Feet per Station	Weekly Hours of Operation	Maximum Capacity Utilization Coefficient	Square Feet per Student Contact Hour
first 40,000	15	45	33	1.0
second 40,000	15	45	35	.9
over 80,000	15	45	40	.8

6.2 Laboratory Space (undergraduate)

This category includes regularly scheduled laboratory space and the associated service facilities. It does not include any laboratory space used primarily for research purposes. A complete description of the space included in this category is presented in Appendix C.

The problems associated with this category are very similar to those identified for classroom space. Again, the two most common input measures are full-time equivalent enrolment and student-contact hours, although very few jurisdictions report standards in terms of full-time equivalent enrolment. New Jersey reported standards for teaching laboratories (sometimes referred to as classroom laboratories) ranging from 5.2 square feet per full-time student for a liberal arts four-year college to 47.9 square feet per full-time student for a two-year career college, laboratory oriented. The standards for universities ranged from 10.0 to 46.9 square feet per full-time student depending on the type of institution.(6) WICHE has recommended that student contact hours be used as the input measure but where this is not possible or feasible that a standard based on the criterion of square feet per FTE student be introduced and yet notes that the latter measure

> "...can be very useful in certain limited applications. They can also be applied inappropriately and therefore may be very dangerous in the hand of the novice."(3)

The value recommended by WICHE was 16.0 assignable square feet per FTE student including service facilities. Taylor, Lieberfeld and Heldman recommended a standard of 18 square feet per full-time equivalent student for the Ontario universities although the actual average was 43.1 square feet (range of 17.3 to 120.3) in 1967-68 and 40.2 square feet (range 11.7 to 123.8 in 1968-69).(1) These data and the recommendation of Taylor, Lieberfeld and Heldman are specifically related to their space classification scheme. Their data for 1967-68 and 1968-69 combine both teaching and research laboratory areas.

Since it is not possible to separate these two categories using the Taylor, Lieberfeld and Heldman space classification scheme, comparisons of this category with the TLH data are not meaningful and should be avoided. This was a further reason for not accepting the Taylor, Lieberfeld and Heldman space classification scheme; the members of the Task Force felt that these two categories had to be treated separately if the planning of these facilities was to be of real value.

Though only New Jersey reported space standards for teaching laboratories based on an enrolment count, it is common practice to report the inventory data in terms of enrolment. In the New York survey, eight states reported their inventory in terms of full-time equivalent enrolment with the values ranging from 11.9 to 39.0 square feet per FTE student (Table 7). (6) The test universities had an average of 15.5 square feet per FTE student in 1970-71 based on available space with a range of 8.9 to 30.6 square feet and an average of 13.5 square feet based on required space (range of 10.9 to 19.7).

In the previous section we went through a detailed explanation of why, in the opinion of the Task Force, the input measure "FTE students" is the least appropriate for regularly scheduled space. Those same arguments, which included the statistical evidence that students at any two institutions are not in scheduled classes the same average number of hours per week, that the variable, hours of operation per week, can distort the standard, and that the number of part-time students can skew the estimates of required space, are also applicable to this category.

Therefore the Task Force agreed not to use full-time equivalent enrolment as an input measure for this category but instead to develop a space standard based on square feet per student laboratory contact hour. Regardless of the input measure selected, a problem arises which did not occur in the consideration of classroom space, namely the effect of the field of study. As to classroom space, it makes little difference whether the subject matter is a classical language or an applied science; the area required per station is effectively the same. This is not true in a laboratory where the required area allowance is largely determined by the subject matter. Out of 17 states in the New York survey reporting standards for undergraduate laboratory space in terms of square feet per student contact hour, eleven quoted area allowances per station as a function of either the field of study or the type of institution (Liberal Arts, Engineering, etc.).(6)

A standard for the factor, square feet per student contact, is again based on four variables: square feet per station, hours of operation per week of the institution, room utilization and seat utilization.

TABLE 7

COMPARISON OF PLANNING STANDARDS - LABORATORY (UNDERGRADUATE)

Square Feet per FTE Student

	Test Universities		Other Jurisdictions[1]		Taylor, Lieberfeld and Heldman[2]		
	Available	Required	Standards	Inventory	1967-68	1968-69	Recommendations
RANGE	8.9 - 30.6	10.9 - 19.7	5.2 - 46.9	11.9 - 39.0	17.3 - 120.3	11.7 - 123.8	-
ADJUSTED RANGE[2]	-	-	-	-	20.2 - 54.7	18.8 - 45.6	-
AVERAGE	15.5	13.5	-	-	43.1	40.2	18.0[3]

1. standards and inventory data from other jurisdictions are listed on Table 7a in Appendix A.
2. two upper and lower values are deleted from the range (reported if at least 5 data points)
3. includes research laboratories.

$$\text{SQUARE FEET PER STUDENT LABORATORY CONTACT HOUR} = \frac{\text{SQUARE FEET PER STATION}}{\text{HOURS OF OPERATION PER WEEK} \times \text{ROOM UTILIZATION RATE} \times \text{SEAT UTILIZATION RATE}}$$

The variables "hours of operation per week" and "room utilization rate" are sometimes combined into a single factor - weekly scheduled hours of operation. Alternately the terms "room utilization rate" and "seat utilization rate" are combined into the capacity utilization coefficient.

Unlike the deliberations on classroom space the Task Force did not reach a decision on undergraduate laboratory space by deciding on a standard for each of the four variables. Instead the Task Force recommended only a standard for the composite factor, square feet per student laboratory contact hour. However, it will prove useful to go through a discussion of each variable to get some appreciation of their effect on the final standard.

6.2.1 Square Feet per Station

The Task Force did not attempt to collect the data required to compute this statistic for the test universities. In the opinion of the Task Force members such data are not very meaningful. A laboratory, for example, may have sufficient stations to accommodate 100 students for a particular experiment and yet accommodate only 50 students during another experiment. Often it is the size and complexity, or the cost of the equipment that determines the number of available stations in a laboratory and for these reasons the capacity of any laboratory is usually flexible.

> "It should be noted that different equipment configurations and the amount of circulation space within the class laboratory affect these unit area allowances." (3)

Data from other jurisdictions are tabulated in Table 7b of Appendix A. The standards ranged from 30 square feet per station for liberal arts courses to 200 to 250 square feet for applied science courses. The data on actual inventory in Table 7b do not exhibit the same range as the standards, only 29.1 to 69.7, but it should be noted that these are averaged over the institution while the standards relate to specific discipline areas within the institution.

A study of space standards for this variable did not reveal any consensus between jurisdictions or institutions but this was anticipated by the Task Force. The area allowances for laboratory stations will often reflect the particular policies of an institution. A university with large professional faculties will usually have proportionately larger laboratories than an institution where these faculties are not dominant. A science-oriented university will generally devote significantly more space to laboratory instruction than a liberal arts college. Thus, standards for this factor become an institutional policy and the Task Force chose to refrain from recommending values for space per station. Instead the aim was to recommend a value for the factor, square feet per contact-hour, such that generally acceptable standards on area allowances per station established by any university can be accommodated.

Only New York has recommended area allowances for laboratory stations based on the size of the institution (i.e. scale factor). In the previous section on classroom space there are references to several jurisdictions that had introduced a scale factor for the area allowance per station. However, scale is less of a consideration in this space category because the orientation is more toward a standard applicable to the various disciplines within an institution rather than a single value applicable to all disciplines across the university.

Some comment should be made concerning the service facilities for this category, such as equipment rooms and preparation areas. In the discussion on classroom space little was said about service space beyond the recognition that 6-7% of the area allowance per seat is devoted to service space (one square foot out of 15 square feet). Service space receives very little consideration in most manuals oriented to the macro level of planning yet these areas are exceedingly important in planning laboratory space, both teaching and research. Whereas only 6-7% of the area allowance per station in classrooms is devoted to service facilities, those jurisdictions that recognize service areas in their standards for laboratory space provide 20 to 50%. The test universities also showed this variation (approximately 20 to 50%) in their data on available space.

6.2.2 Utilization Rates (Hours of Operation per Week, Room Utilization Rate and Seat Utilization Rate)

In discussing utilization rates for laboratories we are faced with the same problem, a base over which to measure the utilization rates, that arose in the discussion of classroom space. The Task Force had collected sufficient data on classroom space to enable capacity utilization coefficients to be derived. The problem resolved to one of comparing these derived coefficients with standards from other jurisdictions. To complete the comparisons it was necessary to normalize the data from the other jurisdictions to a 45 hour week.

Since the Task Force did not collect data sufficient to derive capacity utilization coefficients for teaching laboratory space it is not necessary to normalize the data from the other jurisdictions. The utilization standards are presented here to enable the reader to get some appreciation of the magnitudes involved. Utilization standards for other jurisdictions are tabulated in Tables 7c and 7d. The listed jurisdictions combine hours of operation per week and the room utilization rate into a single parameter, scheduled hours per week. The reader should keep in mind that these standards for scheduled hours per week and seat utilization rates are possibly based on differing week lengths ranging anywhere from 30 to 65 hours per week. The erroneous conclusions that could arise have been discussed in the section on classroom space so the arguments will not be repeated here.

Though no data were collected by the Task Force to enable comparable utilization rates to be derived for the test universities it is interesting to compare utilization standards from the other jurisdictions with the utilization being achieved in those same jurisdictions. Consider the scheduled hours per week. The standards ranged from 15 to 25 hours, or 20 to 24 hours if the two upper and lower extremes are excluded (Table 10c). The actual rates however ranged from 3.4 to 30.8 hours per week and 8.4 to 25 hours if the extreme values are excluded. Thus, as was the case with classrooms, institutions have set utilization standards generally in excess of what they are achieving.

The scheduled hours per week for laboratories are considerably less than the scheduled hours for classrooms. The standards for classrooms ranged from 30 to 34 hours per week. Utilization rates for laboratories are lower than for classrooms because of the specialized nature of the facility. A lecture theatre can be used in the instruction of either liberal arts or sciences, but laboratories are usually not interchangeable; a physics laboratory generally cannot accommodate chemistry laboratory courses. At the present time there is no workable solution to this problem of inflexibility in the use of laboratories, and in setting any standard incorporating this utilization rate cognizance must be taken of this fact.

Standards for seat utilization rates ranged from 67 to 85% for the external jurisdictions with the majority of standards, 15 out of 17, being set at 80% (Table 7d). The actual utilization rates ranged from 13.0 to 93.1% or from 54.0 to 75.2% if the extreme values are excluded. Once again the actual utilization rates are generally less than the standards set by the various institutions. The seat utilization rates for laboratories are higher than comparable rates for classrooms which ranged about 60%. This is to be expected.

> "It is important to recognize that these (room utilization and seat utilization ranges) are not independent measures. Frequently, an increase in the room utilization rate occurs at the expense of the station-occupancy ratio." (3)

We have already stated that the specialized nature of laboratories can be expected to lower the room utilization rate. However, this same fact can also be expected to raise the seat utilization rate since the laboratory is more closely designed to suit the courses taught in that facility.

6.2.3 Square Feet per Student Laboratory Contact Hour

The three variables discussed in the previous two sections, area per station, scheduled hours per week and seat utilization rate, combine to form a single standard - square feet per student contact hour.

$$\begin{array}{l}\text{SQUARE FEET}\\ \text{PER STUDENT}\\ \text{LABORATORY}\\ \text{CONTACT HOUR}\end{array} = \frac{\text{AREA PER STATION}}{\begin{array}{c}\text{SCHEDULED HOURS}\\ \text{PER WEEK}\end{array} \times \begin{array}{c}\text{SEAT}\\ \text{UTILIZATION}\end{array}}$$

While the Task Force did not collect information for the analysis of utilization rates, data were collected as to square feet per student contact hour. The data for analysis were collected on a department by department basis. The test universities were asked to report the total number of student laboratory contact hours taught by each department and the total number of square feet of laboratory space under the jurisdiction of the respective department. They were also requested to report the laboratory space required to adequately accommodate the total number of contact hours.

For the preliminary analyses statistics on square feet per student contact hour were computed for each department at each of the test universities. Using the discipline groupings suggested by Statistics Canada (formerly the Dominion Bureau of Statistics) the factors for similar departments were grouped and compared (the discipline groups are listed in Appendix D). From this initial comparison representatives of the test universities recognized that there were errors and that changes in some of the data would be necessary as well as changes in the departmental groupings. It became obvious that although departments at two universities had the same name they conducted different types of courses with different space requirements, one being laboratory intensive, the other perhaps seminar oriented. Also, what one university classified as laboratory instruction another classified as seminar. Once these questions were settled the problem became that of deciding at what level to group the data. Was a standard to be developed for each branch of engineering or a single value to be recommended encompassing all of engineering or even all of the applied sciences?

The question was resolved to some extent by the fact that certain discipline areas were covered at only one, or at most two, of the test universities and thus a recommendation based only on the data and views of these institutions could have been unduly discriminatory. In all cases, therefore, data were aggregated to such an extent as to ensure that all the test universities were represented at that particular level of the discipline group, except in some cases where even at the highest possible level a university was still not represented. In these cases, which occurred for the professional schools, the criterion was set that the other four test universities must be included. Agriculture was an exception to this rule and was treated as a special case since only one university in Ontario is engaged in this programme.

During the analysis stage it also became obvious that changes would have to be made in some of the initial discipline groupings. Mathematics, for example, is normally included with the Physical and Applied Sciences discipline group yet the laboratory requirements obviously do not match those of physics or chemistry. Agriculture is matched with the biological sciences though the requirements for laboratory facilities are almost double those of departments such as biology and zoology. It was a case of beginning with discipline groupings established for other purposes and of trying to make them fit this study - the classic case of the square peg and the round hole. The Task Force was thus forced to make alterations and modifications during the course of the analyses. The groupings listed in Appendix D are the original groupings presented by Statistics Canada. The reasons for not presenting the modified groupings used by the Task Force in their preliminary analyses will become obvious during the following discussion.

In the end the Task Force considered only three major groupings as a consequence of the aforementioned concerns and these were:

1) Pure and Applied Arts and Humanities (including Mathematics)
2) Physical, Biological and Applied Sciences (except Mathematics)
3) Agriculture (isolated because it is taught at only one Ontario university)

The statistic, square feet per student laboratory contact hour, was computed for each of the discipline groupings (excluding Agriculture because of its unique features) at each of the test universities for both the available and required space. The range of the results was relatively narrow considering the disparity that was exhibited when the comparisons were made on a departmental basis and the fact that the universities were selected for this test because of their differences.

For the pure and applied arts the factor averaged 5.5 square feet per student contact hour (range of 4.3 to 8.2) based on available space and 5.9 square feet (range of 2.7 to 7.1) based on required space. These may seem like considerable spreads but the ranges are more pronounced for the factor square feet per full-time student, where the total laboratory area of the pure and applied arts departments is matched to the full-time enrolment in pure and applied arts programmes rather than to the laboratory contact hours. These ranges are 2.0 to 11.4 square feet per full-time student based on available space and 2.0 to 9.7 square feet per full-time student based on required space.

For the sciences, physical, biological and applied, the derived factor of square feet per laboratory contact hour ranged from 3.9 to 6.7 and averaged 5.8. The estimates of required space varied from a low of 4.5 square feet to 6.7 square feet and averaged 5.2. The Task Force concluded that the test universities had recognized that an improvement can be made in this category.

Once again it is interesting to note the spread based on full-time enrolment in the associated programmes. The laboratory space per full-time student for the sciences ranged from 25.4 to 64.3 based on available space and from 29.2 to 52.2 based on required space.

At first glance it appears surprising that the required laboratory area per contact hour should be greater for the arts and humanities than for the sciences. However, in using contact hours the arts and humanities group includes only those departments requiring laboratory space and in general those requirements can be extensive. Departments such as fine art, drama and geography use larger student station areas than the sciences though one would suspect that the cost of construction would not be as great considering the lack of specialized equipment in those laboratories.

At this stage the Task Force debated whether or not to recommend two standards thereby necessitating the reporting of student laboratory contact hours as two input measures: the contact hours in the pure and applied arts, and the contact hours in the pure and applied sciences. For the academic year 1970-71 the five test universities reported a total for student laboratory contact hours slightly in excess of 100,000 of which approximately 25% were in the arts disciplines. The Task Force agreed that because of the work that would be involved in reporting the input data, two separate standards for laboratory space could not be justified. Also the factors based on required space are quite close, 5.9 compared to 5.2.

The analyses were repeated grouping all disciplines except Agriculture into a single category. The resulting statistics averaged 6.0 square feet per student laboratory contact hour for available space and 5.2 square feet for required space.

The standards in other jurisdictions are listed in Table 8a and Table 8b in Appendix A. The standards and inventory data (listed in Table 8c) from the other jurisdictions are summarized in Table 8 together with the inventory data from the test universities and the Task Force recommendations.

A further comment concerning the results in Table 8 is in order. The dispersion of the inventory data from the other jurisdictions is less than the range of the standards in those jurisdictions because the standards relate to specific disciplines while the inventory data is averaged over all disciplines within a given institution and in some cases averaged over the system. The Task Force concluded that the recommendations on undergraduate laboratory space were reasonable when compared to both the inventory and standards of other jurisdictions.

The Task Force therefore proposes the following recommendations for undergraduate laboratory space:

RECOMMENDATIONS FOR LABORATORY (UNDERGRADUATE) SPACE

1. THE SPACE TO BE INCLUDED IS AS DEFINED ON PAGE 2 OF APPENDIX C OF THIS REPORT.

2. STUDENT LABORATORY CONTACT HOURS SHALL BE ACCEPTED AS THE INPUT MEASURE FOR DETERMINING SPACE REQUIREMENTS IN THIS CATEGORY.

3. STUDENT LABORATORY CONTACT HOURS ELIGIBLE FOR COUNTING IN THIS CATEGORY SHALL MEET THE FOLLOWING REQUIREMENTS:

   i. THEY SHALL OCCUR WITHIN A 45 HOUR WEEK CONSISTING OF 5 or 6 BLOCKS OF CONSECUTIVE TIME AND SUCH THAT EACH BLOCK IS NOT TO EXCEED 9 HOURS.

   ii. THEY SHALL BE RECORDED FOR A FULL WEEK IDENTIFIED BY EACH UNIVERSITY BUT NOT TO PRECEDE THE LAST DAY ON WHICH COURSE CHANGES ARE ALLOWED.

4. LABORATORY COURSES TO BE COUNTED IN THIS INPUT MEASURE SHALL MEET THE FOLLOWING REQUIREMENT:

   > "THE INSTRUCTIONAL ACTIVITY IS CARRIED ON THROUGH DEMONSTRATION OR EXPERIMENTATION AND NORMALLY DEMANDS ADDITIONAL EXPERIMENTATION EQUIPMENT NOT AVAILABLE IN THE CLASSROOM. (IN THIS CASE THE USE OF CLOSED CIRCUIT TV TO COMMUNICATE INFORMATION WOULD NOT NECESSARILY INDICATE A LABORATORY ACTIVITY.) GENERALLY THIS WOULD INCLUDE ART STUDIO LABORATORY AND LANGUAGE LABORATORY COURSES, AS WELL AS THE SUBJECT CLASSROOMS OF FACULTIES OF EDUCATION."

TABLE 8

COMPARISON OF PLANNING STANDARDS - LABORATORY (UNDERGRADUATE)

Square Feet per Student Laboratory Contact Hour

	Test Universities		Other Jurisdictions(2)		Taylor, Lieberfeld and Heldman			Task Force Recommendation
	Available	Required	Standards	Inventory	1967-68	1968-69	Recommendations	
RANGE	4.1 - 6.9	4.5 - 7.1	1.25 - 11.52	1.17 - 7.03	-	-	-	-
ADJUSTED RANGE(1)	-	-	1.38 - 10.00	-	-	-	-	-
AVERAGE	6.0	5.2	-	-	-	-	-	5.2 (8.5 for Agriculture)

1. two upper and two lower values are deleted from the range (reported if at least five data points)
2. standards and inventory data from the external jurisdictions are listed in Tables 8a and 8b in Appendix A

5. ANY SCHEDULED INSTRUCTIONAL ACTIVITY WHICH DOES NOT MEET THE DEFINITION IN RECOMMENDATION 4 SHALL BE CLASSIFIED AS STUDENT NON-LABORATORY CONTACT HOURS.

6. STANDARDS FOR THE SPACE FACTOR, SQUARE FEET PER STUDENT LABORATORY CONTACT HOUR SHALL BE:

   5.2 SQUARE FEET (EXCEPT FOR AGRICULTURE)
   8.5 SQUARE FEET FOR AGRICULTURE

6.3 Laboratory Space (Graduate and Faculty)

This category includes laboratory space generally used for research purposes. Often the laboratory will contain special purpose equipment. A complete description of the category is to be found in Appendix C.

The previous two space categories, classroom and undergraduate laboratory, are generally referred to as scheduled space and though there are problems with projecting facilities requirements for these two categories the identification of feasible input measures is not a primary concern. This is not the case with research laboratories. Research space must be exceedingly flexible, since support for a particular project may be provided for only one or two years. The equipment must then be torn down and space made available for new projects. Naturally this plays havoc with facilities planning. Not only does research laboratory space form a significant portion of a university's space but it is also the most heavily serviced and consequently one of the costliest.

In this study the five test universities showed a requirement for over 500,000 square feet of undergraduate laboratory and over 600,000 square feet of research laboratory space. The Task Force spent considerable time attempting to resolve the difficulties associated with this space category.

One of the major problems in this category is the identification of the population of users. For many of the other space categories this is a simple procedure and the problem is reduced to the selection of the best method of measuring the use of the space. The issue of defining the users for research laboratory has been documented by WICHE in their recent planning manual:

> "...there is no well-defined group of research space-users. The users of such facilities are a mixture of faculty members, students and technicians and other support employees and the numbers within each group may depend more on economic (funding) considerations than on programme considerations." (3)

The Task Force considered using the value of the assisted research fund at a university as a measure of the research activity and thus as a possible input measure. However, this was discounted because, although the assisted (or "sponsored") research fund is a good proxy measure for the current research activity, projections of the value of the fund beyond one or two years would be highly speculative. Universities do not generally solicit research funds and then add academic staff to serve these projects; instead requests are made to support projects and ideas of current staff. The crux of the problem in planning for research facilities is the great uncertainty of long-term forecasting. The Task Force was faced with the problem of developing input measures and standards that will provide sufficient space to accommodate research facilities about which few conceptual notions can be formulated.

The only apparent solution was to determine whether or not, given the present research activities, a reasonable estimate could have been made of their space requirements provided estimates of the number of users were available and realistic projections possible. The first step was to identify the various users.

The central users are of course the academic staff. In the United States it is not uncommon to separate academic staff into two categories: research faculty and instructional faculty. This practice is very rare in Ontario universities though occasionally persons are hired to undertake research projects with or even without light teaching loads. However, this is such a rare occurrence that academic staff were considered as a single group. The Task Force also wrestled with the question of whether or not to include part-time staff. The decision, based on the fact that part-time staff do become engaged in research activities to some extent, was to include them on a full-time equivalent basis.

A second class of users are graduate students. They work closely with the faculty member on the project and in many instances, for a particular discipline area, the number of graduates working on the particular project is a measure of the space required for that research activity. Once again both full-time and part-time students are engaged on these projects and were therefore represented by the use of the full-time equivalent measure.

Post-doctoral fellows were considered as a different classification from either academic staff or graduate students. Post-doctoral fellows sometimes submit proposals for research support and thus are characteristic of the academic staff yet without the academic appointment. They are also similar to senior graduate students in being appointed to a particular research project under the supervision of a faculty member. The Task Force concluded that post-doctoral fellows are significant users of research space.

The Task Force concluded also that technicians and other support staff are secondary users of research space and that the other groups identified previously could be used as a proxy measure for this group. Therefore no data were collected on the number of technicians and other support staff.

Thus, the Task Force worked with three groups of users in their preliminary analyses:

(1) FTE academic staff
(2) FTE graduate students
(3) Post-doctoral fellows

In respect to classroom and undergraduate laboratory space the element of time, incorporated in the utilization rates, was a very important consideration, but time is not a prime consideration in assessing research space requirements. A person spending half of his time on research activities does not necessarily require twice as much space as a similar person who devotes only one-quarter of his time.

Scheduled instruction is accommodated in classrooms or laboratories and on occasion in an academic office. Research activities however are not restricted to the traditional laboratory.

> "Much research activity is carried on in offices and libraries and an increasing amount is being conducted in data-processing facilities." (3)

Nor is laboratory research restricted to the traditional science areas.

> "While it is generally true that engineering, agriculture, and the biological and physical sciences require more space for research activities than do most other disciplines, interests within almost every discipline have broadened to the point where there are no longer disciplines which are strictly oriented toward offices and/or libraries. In almost all departments or disciplines there are individuals who are interested in the experimental aspects (and require laboratory space) and there are those involved in the theoretical aspects (and use office and library facilities)."(3)

And finally it should be recognized that, whereas many areas of a university are people-oriented (offices and classrooms for example), research areas are more or less equipment-oriented. Once again, WICHE has stated this explicitly and adequately in their planning document:

> "Some minimum area which is required to provide an individual with nothing more than benchtop work space can be defined as a matter of architectural consideration and human engineering. This minimum area is probably of the order of 55-70 square feet. Any space required by an individual which is in excess of this minimum amount is a function of the equipment that individual uses in his research work. The space needs generated by such equipment varies drastically - not from discipline to discipline or from department to department, but from project to project and from individual to individual."(3)

Cognizant of these considerations the Task Force commenced the analyses of the data on research space. As a first step the research space in each department of each test university was matched to three populations to discover whether or not a pattern existed using one of these populations and whether or not certain departments could be grouped according to similar requirements. The following populations were used in the first exercise:

(1) full-time graduate enrolment
(2) full-time academic staff
(3) full-time equivalent academic staff plus full-time equivalent graduate enrolment plus post-doctoral fellows.

These first analyses revealed that there was almost no consistency using either full-time graduate enrolment or full-time academic staff. For example, using the population, full-time graduate enrolment, the area per unit population varied from 17 square feet to 160 square feet for geography. Based on full-time academic staff the area varied from 36 square feet to 136 square feet.

The second step was to group departments which appeared to have similar research space requirements. Departments were grouped into two categories, those having significantly heavy space requirements (laboratory oriented) and the non-laboratory oriented (those having less than 100 square feet per unit population where the population is defined as the full-time equivalent academic staff plus the full-time equivalent graduate enrolment and post-doctoral fellows).

If the sum of the full-time equivalent graduate enrolment, full-time equivalent academic staff, and post-doctoral fellows defines the number of full-time equivalent researchers then for the test universities the research laboratory area per FTE researcher in the laboratory oriented disciplines (identified in the recommendations) averaged 197.2 square feet (range of 165.0 to 226.2) of available areas and 185.3 square feet (range of 157.8 to 214.4) based on the indication of required space. The space per full-time equivalent researcher for the remaining disciplines (non-laboratory oriented) exhibited a wide variation. In several cases it was found that the areas corresponded with office space. The members of the Task Force agreed that, since these areas were lightly serviced and represented only a small portion of the total research laboratory area (12,215 square feet under available and 28,603 square feet of required areas), they should be included in Instructional Office and Related Space (Chapter 8).

The Task Force also considered a proposal that the various populations be weighted. A single allocation factor per researcher implicitly assumes that the members of the different populations have equal research space requirements. While the proposal for weights for the various populations may have some merit, the Task Force did not pursue the suggestion for the following reasons:

(a) the members of the Task Force did not feel that the data for the five test universities were sufficient to warrant such a proposal;

(b) from the data collected it was not apparent what form such a weighting scheme should take. In this regard the members of the Task Force could not substantiate, for example, that a doctoral graduate student requires more research area than other graduate students in the same department. It was felt that such an analysis, if adopted, should be done at a very fine level of detail;

(c) while such a scheme might smooth the statistics for the five test universities, it would result in a significant increase in complexity which the Task Force deemed undesirable.

From the preliminary analysis of data two suggestions emerged. First, it was suggested that post-doctoral fellows be omitted as part of the input. The members of the Task Force agreed that a faculty component with a graduate student count should be a good proxy for the research activity. Since there could be administrative savings to the university in reducing the number of input measures without significant effect on the validity of the results, it was thought that the space factors should be re-calculated omitting post-doctoral fellows. Secondly, since graduate students contribute to full-time equivalent faculty, and so were being counted twice in the input measure, it was suggested that an input measure based on full-time faculty and full-time equivalent graduate enrolment be applied to the data. For this definition of researcher, the square feet per researcher for the five test universities varied from 198.1 to 269.4 square feet and averaged 224.9. Based on the required space the average decreased to 211.4 square feet (range from 187.9 to 235.3) per researcher.

Comparisons with other jurisdictions are extremely difficult because of the unique nature of research activities. In addition, a review of the literature revealed only five publications which listed standards on research space. Perhaps the following comment suggests a reason for this:

> "When a person attempts to translate this portion of an educational programme into square feet, he will usually be accused of stifling research development or creating mediocrity through a space-leveling formula." (10)

Because there are so few standards from other jurisdictions, and no current inventory and utilization data, and since the input measures differ for each jurisdiction, the reported standards have been tabulated in Table 9 rather than being relegated to Appendix A. The standards for Louisiana, Arkansas, Connecticut and Indiana are self-explanatory. However, the standards of Bareither require some explanation to facilities planners in the Ontario universities. Bareither introduces the concept of standards for two types of faculty, research and instructional, defined as follows:

> "The FTE research faculty devote 100 per cent of their time to research, whereas FTE teaching faculty are expected to devote approximately 20 per cent of their time to research." (10)

This is the single space category for which the Task Force did not utilize the standards from external jurisdictions in framing their recommendations. This is not to say that the material from other jurisdictions was totally disregarded but its effect was certainly not as pronounced as in other space categories. WICHE, which provided excellent commentary on the problems of planning in this category, has to date refrained from recommending any space standards.

Members of the Task Force would be the first to agree that their recommendations for this category do not rest on as firm a foundation of logic as may the other standards. Instead the Task Force can only support its beliefs with the experience and collective judgement of its members.

From consideration of all these points the Task Force tables the following recommendations with respect to research laboratory space:

TASK FORCE RECOMMENDATIONS ON LABORATORY (GRADUATE AND FACULTY SPACE)

1. THE SPACE TO BE INCLUDED IN THIS CATEGORY BE DEFINED AS ON PAGE 3 OF APPENDIX C OF THIS REPORT.

2. FULL-TIME EQUIVALENT GRADUATE STUDENTS PLUS FULL-TIME ACADEMIC STAFF, ONLY FOR THOSE DISCIPLINES LISTED IN RECOMMENDATION 3, SHALL BE ACCEPTED AS THE INPUT MEASURE FOR THIS CATEGORY.

3. ONLY THE INPUT MEASURES IN THE FOLLOWING DISCIPLINES SHALL BE COUNTED FOR THIS SPACE CATEGORY*:

   i MASS MEDIA STUDIES
   ii PSYCHOLOGY
   iii AGRICULTURE
   iv BIOLOGY
   v BOTANY
   vi HOUSEHOLD SCIENCE
   vii ZOOLOGY
   viii ENGINEERING
   ix CHEMISTRY
   x PHYSICS
   xi GEOLOGY
   xii METALLURGY
   xiii ARCHITECTURE
   xiv P.H.E.
   xv GEOGRAPHY
   xvi FORESTRY
   xvii ASTRONOMY
   xviii ENVIRONMENTAL STUDIES
   xix FINE ART

4. THE FOLLOWING STANDARD SHALL BE APPLIED TO THE INPUT MEASURES DEFINED IN RECOMMENDATIONS 2 AND 3:

   - 210 SQUARE FEET PER FULL-TIME ACADEMIC STAFF AND FULL-TIME EQUIVALENT GRADUATE STUDENT.

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*The members of the Task Force recognize that the test universities did not cover all disciplines and therefore that additions to the list may be necessary.

TABLE 9

COMPARISON OF PLANNING STANDARDS -
LABORATORY (GRADUATE and FACULTY)
SQUARE FEET PER FULL-TIME EQUIVALENT RESEARCHER
PLANNING STANDARDS - OTHER JURISDICTIONS(i)

New York Survey(6):

Arkansas - 1 square foot per FTE undergraduate

65 square feet per FTE Masters student

820 square feet per FTE Ph.D. student

Conneticut - 24 gross square feet per student

Indiana - 10 square feet per FTE faculty in Social Science

100 square feet per FTE faculty in Behavioural Sciences

300 square feet per FTE faculty in Physical Science

600 square feet per FTE faculty in Life Sciences

Bareither(10) - FTE Research Faculty - 7.5 (Commerce) - 375.0 - 675.0 (Engineering)
FTE Teaching Faculty - 1.5 (Commerce) - 75.0 - 135.0 (Engineering)
Headcount Beginning Graduates - 1.5 (Commerce) - 75.0 - 135.0 (Engineering)
Headcount Advanced Graduates - 7.5 (Commerce)- 375.0 - 675.0 (Engineering)

Louisiana(7) - FTE Faculty - 30 (Social Sciences) - 240 (Engineering)
FTE Graduates - 20 (Social Sciences) - 200 (Physical Sciences)

NOTE: The reference numbers refer to publications listed in the bibliography

i. for a more detailed listing the reader is referred to the publications cited in the bibliography.

7. LIBRARY SPACE

7.1 Introduction

> This category includes areas in the library generally referred to as reader or study space, volume storage or stack space and service areas, including offices for library staff. A complete description of the category is included in Appendix C.

In the survey conducted by the State University of New York only New Jersey, out of the 15 states which reported standards for library space, has adopted a single factor to include all areas in the library (11.0 square feet per full-time student). (6) Taylor, Lieberfeld and Heldman have recommended a factor for Ontario of 12.0 square feet per full-time equivalent student for all library space except offices. (1)

While only New Jersey has a library space standard based on enrolment, the states which reported their inventory of library space did so in terms of the full-time equivalent enrolment. Comparison of per student inventory data from the Ontario universities could lead to false conclusions, but the comparison is helpful to explain why there may be differences between jurisdictions and to show the need for a better kind of standard. For this reason the Task Force presents the comparable data from the five test universities (Table 10).

Existing library space per full-time equivalent student varied from 10.5 to 17.9 for the five test universities and averaged 12.6. The average increased to 15.0 (range 12.9 to 17.9) when the factor was based on the indications of required space. Taylor, Lieberfeld and Heldman reported that the average for Ontario was 14.2 square feet per full-time equivalent student (range of 8.3 to 56.4) in 1967-68 and 13.8 (range of 7.6 to 32.9) in 1968-69. However, it should be emphasized that the data from the Taylor, Lieberfeld and Heldman report and from the other jurisdictions do not include provision for office space in the library.

These factors are much higher than factors based on current inventory in other jurisdictions (Table 10). For reasons which will be discussed the Task Force is of the opinion that the current inventory of library space at the five test universities can be justified and that a requirement for additional space in certain areas can be documented.

TABLE 10

COMPARISON OF INVENTORY - LIBRARY SPACE(1)

Square Feet per Full-time Equivalent Enrolment

	Test Universities		Other Jurisdictions(3)		Taylor, Lieberfeld and Heldman(3)		
	Available	Required	Standard	Inventory	1967-68	1968-69	Recommendation
RANGE	10.5 - 17.9	12.9 - 17.9	11.0	2.0 - 15.4	8.3 - 56.4	7.6 - 32.9	-
ADJUSTED RANGE(2)	-	-	-	7.1 - 12.0	-	-	-
WEIGHTED AVERAGE	12.6	15.0	-	-	14.2	13.8	12.0

1. standards and inventory data from the external jurisdications are listed in Table 10a of Appendix A.
2. two upper and lower values are deleted from the range (reported if at least 5 data points).
3. the data for the other jurisdictions and for Taylor, Lieberfeld and Heldman do not contain provision for office space within the library.

Without further consideration a conclusion that might be derived from Table 10 would be, to quote Taylor Lieberfeld and Heldman:

> "...it appears that the university system has some margin for absorbing additional reader stations and books in existing library space accommodation. The capacity margin was approximately 15% on a system-wide basis." (1)

To avoid erroneous conclusions such as this the Task Force studied the requirements for library space by three distinct categories:

(a) reader (or study) area
(b) stack space (volume storage)
(c) service areas

7.2 Reader (or Study) Area

Requirements for reader space, which includes faculty or senior graduate reading rooms within the control of the library, carrels and general reading areas, are based upon two factors - the percentage of a defined population to be seated at any one time, the number of reader stations, and the area allowance per reader station.

The initial problem is to identify the possible populations and to decide, first, whether or not a particular population is to be included and, secondly, for what percentage of the population reader stations are to be provided at any one time. The Task Force considered the library users in two distinct classes, primary users being those for whom the library is constructed and operated, and casual users being those who have incidental library privileges. The latter enjoy the privileges of a facility built primarily for others. Among these casual users the Task Force included the following groups:

(i) all university administrative personnel
(ii) persons from outside the university community

The following groups were considered to be primary users:

(i) full-time students
  - undergraduate
  - graduate

(ii) part-time students
  - undergraduate
  - graduate

(iii) full-time academic staff

Part-time academic staff were excluded since many of the persons in this classification are graduate students and consideration of them as an additional group of users would raise a problem of double counting.

Part-time students can be counted either on a full-time equivalent basis or on a headcount basis. Though no documentation is available it is conceivable that part-time students may make relatively more intensive use of the library space facilities than full-time students, and counting them on a full-time equivalent basis may underestimate their use of this resource. There is also a question of time usage. The full-time and part-time students may use the library during the same hours and thus the maximum demand for reader stations could exceed the total provided by considering the requirements of only one type of user.

The Task Force decided to base the standard for reader seats on the full-time enrolment, augmented by the full-time equivalent of part-time enrolment to provide both for part-time students and the casual library users.

Several publications record standards for the number of reader seats that vary depending on the level of the student. Oklahoma, for example, differentiates between lower division, upper division and graduate students.(6) Wisconsin, on the other hand differentiates only between undergraduates and graduates.(6) A third possibility would be to provide the same percentage of seats for all types of students but to provide different types of accommodation, e.g., carrels for graduates and study rooms for undergraduates.

Comparisons to other jurisdictions are complicated because standards are quoted either on the basis of a composite factor of square feet per student or on the basis of two separate factors, percentage of the population to be accommodated and an area allowance per station. The data from the five test universities will be compared to both of these types of standards.

To this point we have not discussed the third group of primary users, the full-time academic staff. If there is an allowance for academic staff in the provision for office space, should stations also be provided in the library? The library has often been referred to as "the laboratory of the humanist". Academic staff often research material in the library both to reduce the labour of transporting books and documents back and forth and because certain materials cannot be removed from the library.

In reporting data on the number of reader stations the five test universities did not distinguish the number of seats provided for different classifications of users. Only the total number of seats was reported. Therefore, in order to compare the availability of stations in the test universities to the standards from other jurisdictions it was necessary to apply the various standards to the appropriate populations in the test universities and compare the results to the present total number of stations (Table 11).

Based on these standards the number of reader stations at the participating institutions must be judged to be realistic.

The second factor is the area allowance per station. Some jurisdictions differentiate the area allowed per station depending on the user. Other jurisdictions use a single standard. Once again comparisons are difficult because of the many variations and because the available data for the test universities consist only of a single total. Comparisons are therefore made by applying the standards from the external jurisdictions to the appropriate populations in the test universities and comparing the results both to the "available" library area and the "required" library area at those universities (comparisons were not made to "required" stations because the universities did not report this data). Standards are also introduced at this stage for those jurisdictions which base the space factor for library study space on a given number of square feet per unit of population without use of the intermediate factor "reader stations per unit population" (Table 12).

Table 12 shows that the Ontario universities are within the planning standards set by other jurisdictions in terms of both available and required space and are even below the median. As with the other categories however it is necessary to question whether or not the standards are reasonable particularly in comparison with the inventories of available space. Standards for classroom utilization, for example, were significantly higher than current utilization rates making the derived space standard lower than actual and in the opinion of the Task Force unrealistically so. Are the standards for library study area also unduly high or low? If indeed they are low the conclusion based on the data in Table 12 must be that the Ontario universities have little if any capacity for an increased number of library users.

Unfortunately inventories of library study space in other jurisdictions are not available. Therefore it became necessary for the Task Force to make a decision based on the reported standards and the inventory of space at the five test universities. The first questions to be answered were whether the seating capacity should vary depending on the population and if so whether the area allowance should also vary. The Ontario universities differ markedly in their commitment to graduate education and research. If one accepts the

TABLE 11

COMPARISON OF PLANNING STANDARDS - LIBRARY SPACE

Reader Stations

The following is a tabulation of the reader stations that the test universities would have been entitled to if the space standards of the jurisdictions listed had been applied to the appropriate populations at the test universities. Also shown is the actual number of stations at the test universities.

Test Universities

Jurisdiction(1)	Number of Reader Stations(3) (by Standards of the external jurisdictions)	Number of Reader Stations(3) (Available)
California	7,073	
South Dakota	7,073	
Wisconsin	7,261	
Delaware	8,841	7,628
Iowa	8,841	
WICHE(2)	9,557	
Louisiana	9,864	

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1. The standards in terms of percent of population seated are listed in Table 11a of Appendix A.

2. It was necessary to use the following approximations for the WICHE standards:
   - 26 percent of FTE undergraduate enrolment
   - 24 percent of FTE graduate enrolment
   - 20 percent of FTE faculty

3. Only four of the test universities reported the number of reader stations and therefore only data from those institutions have been included in the calculations.

TABLE 12

COMPARISON OF PLANNING STANDARDS - LIBRARY SPACE

Library Study Area

The following is a tabulation of the library study area that the test universities would have been entitled to if the space standards of the jurisdictions or publications listed had been applied to the appropriate populations at the test universities, and the actual library study area at those universities. Also shown is an estimate made by the test universities of the required area in this category and the area based on the Task Force recommendations.

Jurisdiction(1)	Library Study Area (by standards of the external jurisdictions)	Test Universities: Library Study Area (available)	Test Universities: Library Study Area (required)	Test Universities: Library Study Area (Task Force Recommendations)
Indiana	165,744			
Delaware	212,046			
South Dakota	212,046	220,314		
Wisconsin	239,313			
Oklahoma(4)	241,906			
Colorado	265,057		251,001	252,727
South Carolina	265,057			
Montana(3)	267,439			
Iowa	318,068			
Louisiana(5)	330,500			
Missouri	353,268			
Illinois(2)	363,809			
Bareither(7)	364,255			
WICHE(6)	373,593			

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1. the actual standards are listed in Tables 12a in Appendix A.
2. due to data limitations standards for upper and lower division students applied as 3.5 square feet for all FTE undergraduate students.
3. due to data limitations standards for upper and lower division students applied as 6.0 square feet for all FTE undergraduate students.
4. due to data limitations standards for upper and lower division students applied 5.5 square feet for all FTE undergraduate students.
5. due to data limitations standards for masters and doctoral students applied as 12.0 square feet per FTE graduate student.
6. due to data limitations standards for upper and lower division students, and masters and doctoral students applied as - 7.2 square feet per FTE undergraduate
   12.4 square feet per FTE graduate
7. due to data limitations standards for graduates and faculty applied as - 10.0 square feet per headcount graduate student
   9.0 square feet per FTE faculty

premise that graduate students make greater use of the library for researching material than do undergraduate students then a distinction should be made based on the percentage of the population to be seated at any one time. The Task Force accepted this principle but did not feel that a specific additional area allowance for carrels should be provided for graduate students. If a university wishes to make a distinction, the matter becomes one of university policy.

The Task Force was undecided on whether different percentage factors should be set for graduate students as a function of the programme (these would be similar to the type of standards set by Bareither). (10) The Task Force had insufficient data on which to base a firm recommendation and therefore established only a single factor for all graduate students. This is one particular area in which additional research could be done.

At the same time the Task Force agreed that academic staff would not be used as an input measure for this factor. Such input would result in two work areas, office space and library study space, generated for the faculty. The university is free, however, to reduce the space provided by the office space factor and to construct faculty carrels in the library. Otherwise, faculty who use the library when researching material will have to use the study area generated through the student-oriented space factors.

A factor of 5.5 square feet per full-time equivalent undergraduate student was derived from an area allowance of 25 square feet per station and a seating capacity for 22% of the population. The selection of 22% was based on examination of Table 11a in Appendix A and a judgement that 25% was excessive and 20% inadequate. Unfortunately no supporting evidence can be tabled at this time to validate whether or not this is the correct value within that range. A factor of 10 square feet per full-time equivalent graduate student is proposed, based on an area allowance of 25 square feet per station and a seating factor of 40%. The effects of these recommendations are illustrated in Table 12. After examination of the report of the Task Force Space for Education, it was agreed that full-time equivalent students enroled in programes requiring a previous university degree would generate study space at the same rate as graduate students.

The Task Force therefore recommends the following space standards for library reader areas:

1. THE SPACE TO BE INCLUDED IN THIS CATEGORY IS AS DEFINED ON PAGE 5 OF APPENDIX C OF THIS REPORT.

2. FULL-TIME EQUIVALENT UNDERGRADUATE STUDENTS AND FULL-TIME EQUIVALENT GRADUATE STUDENTS BE USED AS THE INPUT MEASURE FOR DETERMINING SPACE REQUIREMENTS IN THIS CATEGORY.

3. THE FOLLOWING SPACE STANDARDS SHALL APPLY TO THE INPUT MEASURES:
   - (a) 5.5 SQUARE FEET PER FULL-TIME EQUIVALENT UNDERGRADUATE STUDENT.
   - (b) 10.0 SQUARE FEET PER FULL-TIME EQUIVALENT STUDENT IN A POST-FIRST DEGREE PROGRAM AND FOR ALL FULL-TIME EQUIVALENT GRADUATE STUDENTS.

The Task Force also recommends that additional studies be undertaken of the utilization of study and reader areas in the library.

7.3 Stack Space

The library at Princeton University housed almost 2,000,000 volumes in 1967-1968 or approximately 420 per student. (26) Michigan State University reported 30 volumes per student for an enrolment of approximately 37,000; the University of Michigan 114 for 34,000 students; the University of Illinois 101 for 45,000 and Florida State University 59 for an enrolment of about 15,000. (26) Across the United States the number of volumes per student ranged from as low as 4 to over 1,000 at several of the seminary colleges. The purpose in tabling these statistics is to show that the number of volumes housed in a particular library is not related exclusively to the size of the institution. Rather it is a blending of several factors such as age, size, graduate enrolment, programmes offered, endowment, etc. Several persons have attempted to quantify the reasons for the size of a library collection. The most notable attempt is the Clapp-Jordan formula, but none have been universally accepted and most have been severely criticized.

The Task Force agreed that the number of materials housed in a university library was not dependent solely upon enrolment but was in fact an institutional policy matter. Only Florida and New Jersey base standards for stack space on an area allowance per full-time equivalent student. (6) The remaining states included in the New York study use a standard based on volumes. The Task Force agreed that the standard for volume storage should be based on the number of volumes.

Space for volume storage includes not only the actual space taken up by the volumes but also space for sorting the books when they are returned to the shelves, space for moving sections, space for growth in particular areas and aisle space between the stacks. These areas are proportionately higher in a small library and therefore the area per volume will be higher. This concept is often reflected in a range of standards based on the total number of volumes. Because the ranges and standards differ from one jurisdiction to the next, comparison with the Ontario universities is difficult. Therefore, to compare the volume storage area at the five universities with the standards from other jurisdictions each of the standards (listed in Table 13a in Appendix A) has been applied to the test universities and the results compared to the available and estimated required stack space (Table 13).

In 1970-71 one of the test universities reported approximately 600,000 bound volumes on record. Counting documents, pamphlets, microfiches, microfilms, periodicals, maps and other items, the number increased to over 2,000,000 items. Therefore, applying the standards only to the number of bound volumes would seriously underestimate the space required. Naturally one volume on microfilm does not require the same storage facility as a bound volume. Several years ago the University of California introduced factors for converting the various media storage units into equivalent volumes. The Library Building Space Reporting Standards Subcommittee of the Ontario Council of University Librarians (OCUL) reviewed these conversion factors and accepted all except those for maps, and for materials in cases and filing cabinets for which OCUL recommended revised factors. These factors, listed in the recommendations, were subsequently adopted by the Task Force.

The Task Force therefore tables the following recommendations for stack (or volume storage) space.

1. THE SPACE TO BE INCLUDED IN THIS CATEGORY IS AS DEFINED ON PAGE 5 OF APPENDIX C OF THIS REPORT.

2. EQUIVALENT VOLUMES SHALL BE USED AS THE APPROPRIATE INPUT MEASURE FOR DETERMINING SPACE REQUIREMENTS IN THIS CATEGORY.

3. THE CONVERSION FACTORS FOR EQUIVALENT VOLUMES SHALL BE BASED ON THE FOLLOWING FACTORS:

Material	No. of items	Volume equivalency(i)
Volumes	125	125 volumes
Computer tapes	125	125
Documents, pamphlets Archives	1000 (items)	125
Microfilm (boxed on shelves)	400 (reels)	125
Microfiche, cards etc. (boxed on shelves cards etc)	10,000	125
Newspapers current titles on display	7 (titles)	125
Newspapers unbound back files	7	125
Newspapers bound back files	9 (volumes)	125

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i. Materials are given in terms of 125 bound volumes since 125 bound volumes represent a standard stack - a single faced section, with dimensions approximately 7½ feet high, 7 shelves 3 feet wide.

Periodicals current titles on display	9 (titles)	125
Periodicals unbound boxed current year	30 (titles)	125
Periodicals boxed back files	included in volume count	
Phonodiscs - records	500	125
- tapes	500	125
- cassettes	1000	125
Reference	45 (volumes)	125
Slides (filed in a carousel boxed)	75 (carousels)	125
Films	125 films	125
Filmstrips (boxed)	2250 strips	125 volumes

For material stored in vertical files, cabinets, carousels, etc.

Material	No. of items	Volume equivalency
Maps	105	125
Microfilm (reels)	315	125
Micro-cards, fiche, etc.	7900	125
Pamphlets	790 (pamphlets)	125
Slides (in cases)		
Bound	2560(slides)	125
Unbound	5120(slides)	125
Filmstrips	580 strips	125
Mounted Photos	790 photos	125 volumes

4. SPACE PER EQUIVALENT VOLUME SHALL BE BASED ON THE FOLLOWING STANDARDS:

	Square feet per Equivalent Volume
First 150,000 volumes	0.10
Second 150,000 volumes	0.09
Next 300,000 volumes	0.08
Remaining volumes (600,000+)	0.07

A comparison of the space provided by these standards to the space derived from standards of other jurisdictions is presented in Table 13.

TABLE 13

COMPARISON OF PLANNING STANDARDS - LIBRARY SPACE

Library Stack Area

The following is a tabulation of the library stack area that the test universities would have been entitled to if the space standards of the jurisdictions or publications listed in the bibliography had been applied to the appropriate populations at the test universities; and the actual library stack area at those universities. Also shown is an estimate made by the test universities of the required area in this category and the space provided by the recommendations of the Task Force.

		Test Universities		
Jurisdiction[1]	Library Stack Area (by standards of the external jurisdications)	Library Stack Area (available)	Library Stack Area (required)	Library Stack Area (Task Force Recommendations)
Missouri	240,483	220,452		
Oklahoma	240,483			
Colorado	274,838			
Ohio	274,838			
South Carolina	274,838			
South Dakota	274,838			
WICHE	274,838			
Louisiana	286,153		275,920	
Arkansas	287,773			279,304
Illinois	287,773			
New York	287,773			
Bareither	287,773			
California	343,547			
Delaware	343,547			
Indiana	343,547			
Iowa	343,547			
Kansas	343,547			
Montana	343,547			
Wisconsin	343,547			

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1. standards are listed in Table 13a of Appendix A.

7.4 Service Space

The final category of library space, service facilities, includes such areas as the circulation desk, cataloguing and binding areas and office facilities for library staff. In many jurisdictions library offices are excluded from this category and instead considered in a general office category, but the Task Force believes that in many cases it is difficult to distinguish offices in the library from other service areas. Several input measures have been suggested as determinants of required space in this category. California and Wisconsin use a highly relevant measure, an area allowance per full-time equivalent library staff. Their standards are 140 and 135 square feet respectively. (6) The Task Force noted several drawbacks in using this approach in Ontario. The most notable is the introduction of an additional input measure. One of the aims of the approach to a formula proposed by the Task Force is to keep the number of input measures to a minimum. A further problem is the definition of full-time equivalent staff for this category. Should the equivalence be based on the salary as a percentage of the average full-time salary, or on the number of hours worked? The normal procedure would be to use a salary basis. The libraries however employ a considerable number of students and a salary basis would clearly underestimate their requirements for work areas. A work station is required regardless of the earnings of the person using that area. While academic and administrative offices tend to be approximately the same size, work areas in the library can vary considerably. The average office standard would be adequate for many of the library staff, but there are certain job classifications within the library system where the average allowances would be inadequate. Areas such as the circulation desks and cataloguing facilities may require up to 300 square feet per station. For these reasons the Task Force decided to seek a better measure than full-time equivalent library staff.

Two alternative methods are to base service space requirements either on a percentage of the space for study area and/or volume storage or on some form of student enrolment. Many of the jurisdictions in the United States use the former approach and the associated standards are listed in Table 14a of Appendix A. In deciding which approach to adopt we must first question what factors determine the amount of service space required in the library. We have stated that the prime determinant of space in the service area is the number of library staff, but what factors determine the size of staff? Several factors can be identified. The number of volumes added per year will be a major consideration, tempered by the degree of automation. The number of students may have little bearing on the collection size, but the number of students will play an important part in determining the library staff required to assist in the circulation and handling of books.

Clearly, then, the best measure might involve a factor which took into consideration both the collection size and an identifiable population. We have already presented the recommendations for study area based on an identifiable population and stack area based on the number of volumes. A standard for service area based on a fixed percentage of these two categories would therefore introduce a factor based on volumes and a user population. At the five test universities the service area, as a percentage of study and stack areas, ranged from 10 to 42% (average of 21%). Based on required space the factor varied from 20 to 43% (average of 25%).

The Task Force also considered the space factor, square feet of library service area per full-time equivalent student. For the test universities the inventory averaged 2.2 square feet (range 1.1 to 3.8). When the required library service area is considered the average is increased to 3.2 square feet (range of 2.9 to 3.9). Though the percentage factor would appear to be the most logical, because it embodies both the requirements based on volumes and the requirements based on the number of users, the Task Force was of the opinion that the variation between the test universities was significant enough to make the percentage factor unreliable. Instead the Task Force agreed to base the standard on the full-time equivalent enrolment with the following recommendations:

1. THE SPACE TO BE INCLUDED IN THIS CATEGORY IS AS DEFINED ON PAGE 6 OF APPENDIX B OF THIS REPORT.

2. FULL-TIME EQUIVALENT ENROLMENT SHALL BE USED AS THE INPUT MEASURE FOR DETERMINING SPACE REQUIREMENTS IN THIS CATEGORY

3. A SPACE FACTOR OF 3.2 SQUARE FEET PER FULL-TIME EQUIVALENT STUDENT SHALL BE USED AS THE STANDARD FOR THIS CATEGORY.

A comparison of the library service space derived by applying these recommendations with service space derived from the standards of other jurisdictions is illustrated in Table 14. Table 15 compares the total library space generated by the Task Force recommendations to the space calculated by applying the standards from other jurisdictions. Unfortunately it was possible to list only those jurisdictions whose standards could be applied to the Ontario system.

Of the ten jurisdictions whose standards for total library area could be compared, only four were less than the standards proposed by the Task Force (Table 15). The area allowances for volume storage are within the standards listed for other jurisdictions, 11 out of 19 reporting equal or larger factors. The smallest area allowance,

TABLE 14

COMPARISON OF PLANNING STANDARDS - LIBRARY SPACE

Service Space

The following is a tabulation of the library service area that the test universities would have been entitled to if the space standards of the jurisdictions or publications listed in the bibliography had been applied to the appropriate populations at the test universities, and the actual library service area at those universities. Also shown is an estimate made by the test universities of the required area in this category, and the space provided by the recommendations of the Task Force.

		Test Universities		
Jurisdiction[1]	Library Service Area (by standards of the external jurisdictions)	Library Service Area (available)	Library Service Area (required)	Library Service (Task Force Recommendation)
Indiana	53,038			
Louisiana	82,625			
Illinois	90,952			
Bareither	91,064			
South Carolina	107,979	93,532		
Oklahoma	120,597			
Iowa	127,707			
Colorado	134,974			
Missouri	148,438		137,138	137,138
WICHE	162,108			
California[2]	122,000 - 161,000			
Delaware[2]	118,000 - 156,000			
New York[2]	more than 174,000			

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1. standards for the external jurisdictions are listed in Table 14a of Appendix A.
2. because of insufficient data only approximations can be presented.

TABLE 15

COMPARISON OF PLANNING STANDARDS - LIBRARY SPACE

Summary Review

The following is a tabulation of the total library area that the test universities would have been entitled to if the space standards of the jurisdictions or publications listed in the bibliography had been applied to the appropriate populations at the test universities, and the actual library area at those universities. Also shown is an estimate made by the test universities of the required area in this category and the space provided by the recommendations of the Task Force.

		Test Universities		
Jurisdiction	Library Area (by standards of the external jurisdictions)	Library Area (available)	Library Area (required)	Library Area (Task Force Recommendation)
Indiana	562,239	534,298		
Oklahoma	602,986			
South Carolina	647,874			
Colorado	674,869			
Louisiana	699,278		675,200	677,638
Missouri	742,189			
Illinois	742,534			
Bareither	743,092			
Iowa	789,322			
WICHE	810,539			

reported for Missouri and Oklahoma, is approximately 20% less than the Task Force recommendation; the largest, reported for several states, is 50% higher. While the test universities are currently utilizing less stack space than the lowest standard, more stack space is required to increase the efficiency of operation. As the publication rate increases, additional stack space between collections will be required; several universities have collections which are inadequately housed. The Task Force has been mindful, throughout its deliberations, that statistics representing a current situation cannot arbitrarily be accepted as adequate standards.

Differences in standards for reader, or study, area arise because of differing standards for the percentage of a population to be accommodated at one time and the area allowances per station. These must be recognized as matters of institutional policy and thus a recommendation of the Task Force should ensure that these policies can be initiated. This is not to say that the recommendation of the Task Force should merely be set at a standard which derives the greatest "required" area at one of the institutions but rather, it should be an average standard which can accommodate most of the policies. If an institution wishes to use other standards, it may do so by reducing space for other categories.

The standards proposed for library service area would give the test universities more space than standards from eight out of the ten jurisdictions for which comparisons could be made. In order to ascertain whether or not the standards which would provide less space are realistic, one should consider the office area which could be provided. The five test universities had approximately 870 full-time library staff. The standards from the external jurisdictions, which would result in less space than the Task Force recommendations, would provide between 53,000 and 135,000 square feet of service space or from 61 to 155 square feet per full-time library staff. From this area, space must be provided for the circulation desks, reference areas, part-time staff and other service areas. A factor of 155 square feet will barely support adequate services. Anything less would be intolerable.

8. OFFICE SPACE

Before considering appropriate space standards, the Task Force found it necessary to identify the possible categories of office space and the associated input measures. One approach would involve reporting all personnel by job classification and applying a space standard to each classification, though problems would arise in delineating possible job classifications with definitions and in reporting these data to a central agency.

The Task Force resolved this problem by recognizing only three major groupings of office space: library office space, instructional staff offices and attendant service space (including departmental administrative offices), and all other office space not classified in either of the previous categories. The reason for introducing this particular categorization of office space was that the appropriate input measures for the three categories are significantly different.

Library office space was separated because it is often very difficult to distinguish what area is strictly office space and what area is library service area for referencing, cataloguing and distributing books. This category has already been treated under Library Service Space in Section 7.4.

8.1 Instructional Staff Offices and Related

> Included in this category are the office and supporting facilities for all academic staff below the rank of Dean, graduate assistants and departmental support staff. A complete description of the space included in this category is to be found in Appendix C.

Three possible input measures were considered by the Task Force: student enrolment, full-time academic staff and full-time equivalent academic staff. A few of the jurisdictions surveyed in the New York study reported standards based on the full-time equivalent enrolment and this was the input measure first studied by the Task Force.(6) Several jurisdictions reported inventory based on a full-time equivalent enrolment. Comparisons are complicated for this input measure because of the differences in space included. When the input measure or the reported inventory is listed in terms of full-time equivalent enrolment then the category embraces all office space. Therefore, for the Ontario universities it was necessary to add on the inventory data for all other office space except that in the library. The comparative data are listed in Table 16.

At present the area per full-time equivalent student is greater than the inventory data from the Taylor, Lieberfeld and Heldman inventory of the Ontario universities in 1967-68 and 1968-69 and the recommended standard of 22.0 square feet per full-time equivalent

TABLE 16

COMPARISON OF PLANNING STANDARDS - OFFICE SPACE(1)

Square Feet per FTE Student

	Test Universities(2)		Other Jurisdictions		Taylor, Lieberfeld and Heldman		
	Available	Required	Standards	Inventory	1967-68	1968-69	Recommendations
RANGE	18.3-35.6	21.4-31.3	13.2-40.0	9.5-129.5	18.0-54.3	16.2-48.0	-
ADJUSTED RANGE(3)	-	-	-	-	27.6-44.5	24.9-36.2	-
AVERAGE	22.8	23.8	-	-	31.1	29.0	22.0

1) standards and inventory data from external jurisdictions are listed in Table 16a of Appendix A

2) excludes library office space

3) two upper and two lower values are deleted from the range (reported if at least 5 data points).

student. Comparisons with external jurisdictions are difficult since only three states reported standards in this format and only five reported inventory. The area allowances were also very divergent.

A standard based on square feet per full-time equivalent student presupposes that each institution has approximately the same student to staff ratio. If in fact the ratios differed significantly, then institutions with a student to staff ratio below the average would require a higher standard to support offices of comparable size to institutions with the average student/staff ratio. The space standard may have a built-in discrimination factor which has the effect of overriding policy decisions that should be made at the institutional level. For example, an institution may be able to lower the student to staff ratio by judicial financial management but find itself constrained by inadequate capital allowances.

Because of wide variation in student/staff ratios the Task Force rejected the use of full-time equivalent students as an input measure for this category and instead turned to a measure based on the number of academic staff. Before proceeding to a discussion of this input measure we should emphasize that this category encompases more than academic staff offices. Also included are office facilities for all departmental support staff such as secretaries, technicians, laboratory demonstrators and graduate assistants plus service space such as storage, duplicating and conference facilities.

At the start of the exercise the Task Force hypothesized that the total area allocated to a department could logically be considered in two segments (presumably with different input measures); academic faculty office space and other departmental support space. The Task Force further decided to explore the extent to which the area allowances for these segments varied from one department (or group of departments of related disciplines) to another. It was found that wide variations occurred in the resulting factors for all input measures applied. These variations were thought to be explained by historical developments or the implementation of various policies. For example, the age of a building or the departmental growth rate could create abundant or confined spaces. Further, the number of graduate students and policies regarding graduate and graduate assistant working areas or the type of graduate and faculty endeavours could have severe impact in the determination of the areas allocated to a department. For these reasons the Task Force felt that a set of factors for various departments was inappropriate. It also suggested that the total areas for academic staff offices and related service areas should be treated as a single complex directly related to the activities of faculty and their supporting requirements for which the appropriate input measure would be full-time equivalent faculty.

The five test universities reported an average of 243.1 square feet of instructional staff office and related areas per full-time equivalent faculty with a range of 200.0 to 280.1 square feet. On the average they felt that they required 243.8 square feet (range 200.7 - 284.7). Comparisons of these data with other jurisdictions are difficult primarily for two reasons. First, it cannot be assumed or readily confirmed that the populations determining the full-time equivalent component for part-time faculty are similar. For example, the proportion of graduate assistants contributing to full-time equivalent faculty may vary significantly from one jurisdiction to another. Secondly, the means by which the full-time equivalent of faculty is determined may produce base values that are misleading. In Ontario the contributions of full-time graduate students to full-time equivalent faculty are restricted by the Operating Grants Formula. Thus, it is possible that the full-time equivalent of graduate assistants underestimates their demand against the available facilities. The members of the Task Force feel that the above factors distort the instructional staff office and related areas per full-time equivalent such that comparisons with other jurisdictions can only be approximate.

New York(6) reports planning standards for eight jurisdictions for faculty office areas (excluding service components) with a range from 110 to 160 square feet per full-time equivalent academic (see Table 17a in Appendix A). To make these figures comparable to the data for the five test universities, allowances have to be made for the following components which are not included in the standards of other jurisdictions:

1. service areas such as reception areas, conference facilities, lounges, etcetera.

2. work stations and/or offices for departmental support staff including administrative personnel, secretaries, clerical staff and in some cases technicians.

3. graduate student work areas.

The service area component can be estimated by using standards of other jurisdictions. New York(6) reports two jurisdictions where service area standards are expressed as a percentage of total office areas. The two standards cite additional allocations of 25 and 40 percent of office space as service areas. The same report lists standards for office areas including service allowances for five jurisdictions ranging from 135 to 168 square feet per full-time equivalent faculty member (see Table 17b in Appendix A).

Calculating a component for departmental support staff work station areas is considerably more difficult. The five test universities reported a ratio of permanent departmental employees to full-time equivalent faculty of 1.07. No full-time equivalent measure for support staff was reported, but the members of the Task Force feel that an allocation of 20 square feet per full-time equivalent faculty can be put forward for this component. This would allow one full-time equivalent support staff person with an average work station allowance of approximately 80 square feet for four full-time equivalent faculty. It should be emphasized that this represents an average allocation based upon an estimate of the full-time equivalent of departmental support staff.

The final component to be added to the basic office allowance is that for departmental graduate student work areas. These areas have been included in this space category for the following reasons:

1. It is very difficult to differentiate between work stations allocated to graduate students and to graduate students employed for academic related functions.

2. There seems to be a trend toward a greater participation by graduate students in the instructional activities of the university.

3. The contribution of full-time graduate students to full-time equivalent faculty is restricted by the Operating Grants Formula in use in Ontario.

The five test universities reported an average of 41.3 square feet of graduate work areas per full-time equivalent faculty. In terms of graduate students this represents 25.6 square feet per full-time equivalent graduate student. The University of Manitoba(27) recommends a work station allowance of 50 square feet for each full-time equivalent graduate student while New York(6) reports two standards for graduate assistant office allowances of 70 and 120 square feet.

These additional components have been combined on Table 17 with the standards for the basic office area cited by other jurisdictions in the New York(6) study. The resulting standard for a space category, based on standards of other jurisdictions, comparable to that used by the Task Force has a range from 235.7 to 268.7 square feet per full-time equivalent faculty.

To complete discussion of this category two additional items have to be introduced. The range of standards from other jurisdictions has as one of its components an allowance of 50 square feet per full-time equivalent graduate student. However some graduate students contribute to full-time equivalent faculty and therefore would earn additional space entitlement if full-time equivalent faculty was used as the input measure. Data was not collected to enable calculation of the total contribution of graduate students to full-time equivalent faculty; however, an estimate of space entitlement for them can be made. Assuming an average faculty salary of $15,000, a full-time graduate student earning $1,800 would constitute .12 full-time equivalent faculty (that is $1,800 ÷ 15,000). Using a space standard of 243 square feet per full-time equivalent faculty, such a graduate student representing .12 full-time equivalent, generates

TABLE 17

PLANNING STANDARDS FOR
INSTRUCTIONAL OFFICE AND RELATED AREAS
SQUARE FEET PER FTE FACULTY

Range for Basic Office Area(1)	Range for Office Area Including Service Area(1)	Support Staff Work Area(2)	Graduate Work Area(3)	Total Area
110 - 160	135 - 168	20	80.7	235.7 - 268.7

1) From standards of other jurisdictions (see Tables 17a and 17b in Appendix A).

2) Estimated allowance for support staff work area per FTE faculty.

3) Standard of 50 square feet per FTE graduate student from other jurisdictions adjusted by FTE staff to FTE graduate student ratio for five test universities.

29.2 square feet. The total space entitlement including the 50 square feet allowance as a full-time equivalent graduate student would be 79 square feet. In view of the standards of other jurisdictions for graduate assistant office space (70 and 120 square feet (6)), the Task Force feels that the above allocation mechanism is acceptable.

It should be noted as stated in the section on Laboratory (Graduate and Faculty) Space, that 12215 square feet of available space and 28603 square feet of required space have been moved from that category to Instructional Office and Related Areas (included in the above calculations and recommendations). These areas were reported for non-laboratory oriented disciplines and in several cases were actually miscoded academic office space.

Thus, after examining the actual data and the areas thought to be required at the five test universities, and in view of the published standards and inventory of other jurisdictions, the Task Force recommends that:

1. THE AREA TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 4 OF APPENDIX C OF THIS REPORT.
2. FULL-TIME EQUIVALENT FACULTY BE ACCEPTED AS THE INPUT MEASURE FOR DETERMINING SPACE REQUIREMENTS IN THIS CATEGORY.
3. THAT THE STANDARD FOR THIS CATEGORY BE ESTABLISHED AT 243 SQUARE FEET PER FULL-TIME EQUIVALENT FACULTY.

8.2 Office (Not elsewhere classified) and Related Areas

> Included in this category are offices and related areas for deans, administrative staff and support and clerical personnel. A complete description of this category is given in Appendix C.

The primary reason for classifying this area, library office space and instructional and related office space separately has already been presented. However, in addition to the belief that these categories could best be treated using different input measures, the members of the Task Force felt it highly desirable that separate space standards be developed. It was agreed that they could contribute significantly to the planning processes for the universities in Ontario.

The members of the Task Force considered two populations as potential input measures for this category;

1. full-time equivalent enrolment, and,

2. administrative staff.

It might be argued that administrative staff would be the most logical input measure, but the use of administrative staff implicitly assumes some form of equivalence determination; and since academic staff contribute to the administrative function of the university it would be difficult to avoid excessive allowances given both academic and administrative allocations. For these reasons, and in view of the variances resulting from the two potential input measures, the Task Force selected full-time equivalent enrolment as the input measure for this category.

The five test universities reported an average available area for this category of 7.5 square feet per full-time equivalent student with a range from 4.0 to 13.8. The average required area was 8.9 square feet per full-time equivalent student (a range from 6.7 to 14.2). Although the data exhibited a wide range of variation, it was found that the average remained approximately constant if the high and low values were omitted from the calculation. The standards and inventory data available from other jurisdictions for office space per full-time equivalent student were presented on Table 16 . These standards refer to all office space, including this category as well as library and academic office areas. The members of the Task Force agreed that without additional data it would be difficult to provide a better estimate of the proper space factor.

Thus the Task Force, after examining the data for the five test universities for the available and required areas, and after reviewing the standards and inventory for other jurisdictions, recommend the following:

1. THAT THE AREA TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 11 OF APPENDIX C.
2. THAT THE INPUT MEASURE FOR DETERMINING ALLOCATION OF THIS CATEGORY OF SPACE BE FULL-TIME EQUIVALENT ENROLMENT.
3. THAT THE STANDARD FOR THIS FACTOR BE ESTABLISHED AT 8.9 SQUARE FEET PER FULL-TIME EQUIVALENT STUDENT.

9. ATHLETIC AND RECREATIONAL SPACE

> Included in this category are all athletic facilities such as gymnasia, basketball and handball courts, indoor swimming pools, spectator seating areas, locker and change space, and other related service areas.

The evaluation of existing facilities as well as the projection of required areas for this category is a complex problem involving the interplay of a number of factors embracing among others the institutional policies. Also included might be the academic level and sex of the population of users, the range of programmes offered by the institution, the location in terms of urban or rural setting, the proportion of residential population within the institution, as well as the availability of capital funds. Further, an analysis of utilization of capacity is generally inappropriate except at a very fine level of detail due to the uniqueness of the facilities. An additional factor that may have some relevance in considering the available facilities and needs for the universities in Ontario is their relative age. While it might be inappropriate to introduce a compensating component into the space allocation factor for this category of space, the existing facilities at some of the universities are a reflection of the conscious ordering of building priorities to limited capital funds.

It should be noted that this category includes the special areas demanded for physical health and education programmes insofar as they can be classified in the definition. Before identifying the input measure chosen, it should be stated that student contact hours were not examined as a possible input measure primarily for two reasons. First, student contact hours for these facilities in the physical health and education programmes represent only a fraction of the total utilization of this category of space. Secondly, the actual programmes and policies of various universities regarding utilization of these facilities are thought to be such that wide variations in the factor would be realized. The Task Force felt that a standard based on scheduled student contact hours for these facilities could only have meaning on a "per facility type" basis. Since the actual configuration of the facilities should be planned internally by each university from total requirements, the Task Force rejected student contact hours as a potential input measure.

The populations considered as potential input measures were student enrolment, academic faculty, administrative and departmental support staff. The users of the athletic and recreational facilities could be classified as primary and secondary users. The student population would constitute the primary population with all others classified as secondary users. While the Task Force acknowledged that those classified as secondary users in some cases utilize some of the available facilities to a greater extent than the student body, it feels that the appropriate input measure should be based upon student enrolment. It was agreed that allowances for such facilities should not be justified through the utilization by the secondary population. Further, they were of the opinion that part-time students generate some need for this category of space. For these reasons the Task Force chose full-time equivalent student enrolment as the input measure.

The five test universities reported an average of 5.3 square feet of actual area per full-time equivalent student for this category. With one of the five universities reporting a negligible amount of space the corresponding range across the five universities was from 0 to 10.0 square feet per full-time equivalent student (with an average absolute deviation of 3.1 from the mean). The five test universities were in closer agreement regarding the areas they felt they required. For this they reported an average of 10.4 square feet per full-time equivalent student with a range from 9.6 to 13.0 (with an absolute average deviation of 0.86). The deviations are introduced here for two reasons. First, there are extreme variations in the presently available athletic and recreational facilities for the five test universities. The Task Force suspects that such variations are typical for the entire province. Secondly, from an examination of the areas thought to be required, there appears to be strong agreement as to what the standard allocation factor should be.

Standards for this category were found for only four other jurisdictions (see Table 18a in Appendix A). These ranged from 3.0 square feet per full-time equivalent graduate student to 12.1 square feet for a full-time equivalent undergraduate. Three of the four jurisdictions cited additional allowances for full-time equivalent staff. No inventory data were available. Table 18 summarizes these data along with the Taylor, Lieberfeld and Heldman recommendation. It should be noted that this factor includes provision for special athletic facilities for physical health and education programmes.

After examining the actual area reported by the five test universities for this category and comparing the required areas with standards of other jurisdictions the Task Force recommends that:

1. THE AREAS TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 7 OF APPENDIX C OF THIS REPORT.

2. THE INPUT MEASURE TO BE USED FOR CALCULATION OF SPACE ALLOCATION FOR THIS CATEGORY BE FULL-TIME EQUIVALENT ENROLMENT.

3. THE STANDARD FOR THE SPACE FACTOR BE ESTABLISHED AT 10.4 SQUARE FEET PER FULL-TIME EQUIVALENT STUDENT.

TABLE 18

COMPARISON OF PLANNING STANDARDS - ATHLETIC AND RECREATIONAL SPACE(1)

NASF PER FTE STUDENT

	Test Universities		Other Jurisdictions(2)		Taylor, Lieberfeld and Heldman			Task Force
	Available	Required	Standards	Inventory	1967-68	1968-69	Recommendations	Recommendation
RANGE	0 - 10.0	9.6 - 13.0	3.0 - 12.1	-				
AVERAGE	5.3	10.4	-		8.6(3)	8.0	11.0	10.4

(1) The areas included in this category are defined in Appendix C.

(2) The standards are listed on Table 18a in Appendix A

(3) Excluding area for the University of Toronto

10. SERVICE SPACES

This section deals with the remaining components of net assignable space within the universities. For the five test universities these components represented approximately 11.1 per cent of the total available assignable area. Most jurisdictions list standards for these areas in three or four general classifications such as general use, special use, supporting services etc. The members of the Task Force felt a more detailed examination would be beneficial in that variations among the universities could be identified. In this way extreme variances could be justified by the members of the Task Force or omitted from consideration in forming the recommendations.

Because these areas represent residuals of space classification schemes few comparable categories for the various jurisdictions can be identified and so little in the way of external comparisons will be made in the following pages. For example, Taylor, Lieberfeld and Heldman(1) have recommended allocation factors for special use, general use and supporting facilities totalling 52 NASF per full-time equivalent student. The total recommendations of the Task Force in this section represent approximately 25.7 NASF per full-time equivalent student. Besides the observation that the areas covered by these two sets of factors are quite different, the Task Force feels that a more fundamental conclusion should be drawn. The individual elements of a space classification scheme and their corresponding space factors should not simply be examined in isolation with other space classification schemes but rather there should be some awareness of the contribution of the element to the total scheme.

Coefficients are derived for various terms in an attempt to generate a total area allowance. The value of the scheme is not solely in the coefficients but more importantly in the totals generated. If this total is consistent and equitable for the institutions to which it is applied then it can be said to have some value. While the Task Force has taken the view in this paper that each component should be justifiable in itself, the major benefits will be derived if these factors combine in total to provide reasonable equity in capital funding for the universities of Ontario.

10.1 Food Service

Included in this category are all food service facilities within the university such as cafeterias, food preparation facilities, university residence dining halls, staff dining halls and food service areas, vending machine areas. A complete description of this category is given in Appendix C.

The Task Force considered two populations as potential input measures for food service areas, student enrolment and university staff. As with many of the space categories previously discussed, the latter group can add significantly to the total demand for this type of facility. However, in examining the data, the variations resulting when any component of staff was used were much wider than those for student enrolment alone as a factor. It was suggested that staff may be more disposed to using off campus facilities or possibly eating frequently in their own offices. Additionally it was pointed out that students may use the available food service areas for several meals a day while staff may rely on them for lunch only. All of this seemed to confirm that student enrolment might provide a more consistent input measure for this space category.

Both full-time and full-time equivalent enrolments were tested as possible input measures. The average deviations resulting from the use of full-time equivalent enrolment were approximately equal to those for full-time enrolment, but prospective patterns of part-time student utilization suggest that a greater equity would result from use of full-time enrolment alone. It is thought that part-time students in general make little demand on the peak load for food service, yet the proportion of part-time students in full-time equivalent enrolment is expected to increase through the coming years.

The five test universities reported an average of 8.0 square feet of available food service areas per full-time student (range from 7.1 to 9.1). They felt they required an average of only 7.4 square feet per full-time student with a range from 4.8 to 9.1. In terms of full-time equivalent enrolment, the available area was 7.0 while the required area was 6.4 square ~~feet~~ per full-time equivalent student. No inventory data for other jurisdictions could be found for the category. However two standards were identified which together with the following model may bring the subject into a better perspective. Area per population member can be calculated as a function of the number of stations, the area per station and the given population of users in the following way:

$$\text{AREA PER POPULATION MEMBER} = \frac{(\text{NUMBER OF STATIONS}) \times (\text{AREA PER STATION})}{\text{POPULATION}}$$

If we assume that the population consists of all users of the areas and only users, and that the entire population expects to be served at each meal period, the turnover rate, or the rate such that all members of the population can be served by the available facilities is

$$\text{TURNOVER RATE} = \frac{\text{POPULATION}}{\text{NUMBER OF STATIONS}}$$

Using the above two equations and their assumptions the

$$\text{TURNOVER RATE} = \frac{\text{AREA PER STATION}}{\text{AREA PER POPULATION MEMBER}}$$

WICHE(3) lists standards of 10.0 to 12.5 square feet per station for food service areas corresponding to snack bar to dining hall areas. Louisiana(7) lists an area allowance of 15.0 square feet per station plus a service component for dining hall areas. If we assume an overall average of 12.0 square feet per station plus 25%-30% for service, and a required area per population of 7.5 square feet the resulting turnover rate is about 2.0. By choosing our population as we have, i.e. only full-time enrolment, we have maximized our estimate of area per population member and minimized the resulting turnover rate.

Therefore the members of the Task Force, after examining the data for its available areas, and in view of the facilities considered to be required for this space category, recommend that:

1. THE AREA TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 8 OF APPENDIX C.

2. THE INPUT MEASURE FOR DETERMINING THE AREA ALLOWANCES FOR THIS CATEGORY BE FULL-TIME ENROLMENT.

3. THE STANDARD FOR THIS FACTOR TO BE 7.5 SQUARE FEET PER FULL-TIME STUDENT.

It should be noted that this category includes university residence facilities. The proposed entitlement represents a decrease in area from the available facilities, and its implementation may require phasing.

10.2 Bookstore, etcetera

> Included in this category are all areas related to the merchandising efforts provided by the university as a service to its students (excluding all food service components). Among these areas are bookstore facilities, post office, and related service areas.

Only one standard for this category of space was found for an external jurisdiction. In the New York(6) study it was reported that Illinois had a standard for this space category ranging from 1.0 to 4.5 square feet varying by level of student per full-time equivalent enrollee. These are the same standards recommended by Bareither and Schillinger.(10) The Task Force did not feel that this category warranted introducing a further dimension to the input measures already adopted. For this reason, and in view of the use of full-time equivalent enrolment as an input measure for service areas for other jurisdictions the Task Force agreed to accept full-time equivalent enrolment as the input measure for this space category.

The five test universities reported an average of 1.3 square feet per full-time equivalent student for this category with a range of 0.7 to 2.9. On the average they felt they required 1.8 square feet per full-time equivalent student (the range was 1.3 to 2.8).

In view of the available data, and after examining the required allocations and available standards the Task Force recommends that

1. THE AREAS TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 9 OF APPENDIX C.
2. THE INPUT MEASURE FOR DETERMINING SPACE ALLOCATIONS FOR THIS CATEGORY BE FULL-TIME EQUIVALENT ENROLMENT.
3. THE STANDARD FOR THIS FACTOR BE ESTABLISHED AT 1.8 SQUARE FEET PER FULL-TIME EQUIVALENT STUDENT.

10.3 Maintenance Space

> Included in this category are all spaces associated with the operation and maintenance of an institution's buildings, grounds and other elements of physical plant. This category includes all shop areas, as well as central and general storage areas, utility space, central communication and equipment spaces, refuse and incinerator areas. A complete description of this category is found in Appendix C.

The identification of the extent of areas that this category of space should include was a more time consuming task than was directly warranted in view of the total areas involved. The available space for this category for the five test universities represented approximately 2.8 percent of the assignable space. However the Task Force identified a number of considerations which they felt made a classification which included utility space unsuitable for space formula entitlement.

The heating and chilling facilities at a university can be a reflection of several factors. They are influenced by the available technology during the period in which the buildings were planned, and the resulting demand for space can vary widely. Insofar as these facilities can, in certain instances, be exterior to the building itself, further complications are introduced in establishing a space factor.

Just as the available areas for heating and chilling facilities can reflect the past building history of a university, it is often reasonable to state that these same areas can be an indication of the expectations of the university planning staff. For an expanding institution the systematic planning of these areas should be encouraged because of the magnitude of expensive equipment involved. Inclusion of these facilities in a space formula, while not denying systematic planning, does introduce a significant constraint.

The Task Force also considered the possible interaction with the operating grants formula. For example, operating economies can be realized by building central heating or chilling facilities instead of non-centralized facilities. These economies may be defined by assuming a longer-term planning span than that of the capital formula. Where the planning horizons do not agree, it is possible that the capital formula would actually encourage sub-optimization of capital resources. In this regard a further point of interference is that several universities in Ontario have built central utility plants to interface with a health science complex. In such cases definition of space to be carried on the university space inventory would probably be quite arbitrary. Because the type of heating or chilling facility can have opposite effects on the operating and capital formula, the members of the Task Force felt that such areas should not be included in a space formula.

The Task Force estimates that utility area represents approximately 1/3 of the required area in this category for the five test universities. The members of the Task Force do not feel that such a proportion of total area should be taken off formula entitlement and so the recommendations for this category include some provision for utility space. It is recommended however, that the above considerations be included in evaluation of university building programmes.

The Task Force considered two potential forms of input measure for maintenance areas. These were:

1. some component of the total population of the university
2. some measure of the area of the university to be serviced

The available standards for other jurisdictions for maintenance space choose the latter form generally taking the input measure to be net assignable area (see Table 19a in Appendix A). No standards for utility space or inventory data for other jurisdictions were found for this category.

The Task Force tried full-time equivalent enrolment, net assignable area and gross university area as potential input measures. The most consistent measure was found to be gross university area (including university residences, education and health science facilities). The five test universities reported an average available area for maintenance and utility space of 1.6 percent of the gross area of the university (with a range of 1.4 to 2.6). On the average they felt they required 2.0 percent with a range from 1.6 to 2.4 percent of the total gross university area.

In view of the available and required space for the five test universities, and after consideration of the standards available for this category, the Task Force recommends the following:

1. THE AREA TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 10 OF APPENDIX C.

2. THE INPUT MEASURE FOR GENERATING ENTITLEMENT FOR THIS CATEGORY OF SPACE BE TOTAL UNIVERSITY GROSS AREA.

3. THE STANDARD FOR THIS CATEGORY BE ESTABLISHED AT 2.0 PERCENT OF THE TOTAL UNIVERSITY GROSS AREA.

Taylor, Lieberfeld and Heldman reported a ratio of assignable area to gross area for the provincially-assisted institutions in Ontario of 0.60. This ratio has been applied to the standards of other jurisdictions using net assignable area as an input measure. These normalized standards are presented on Table 19 along with the recommendation of the Task Force.

10.4 Academic Service Space

> Included in this category are all areas associated with the production or distribution of audio-visual equipment and material. This includes audio-visual studios and their attendant service areas. A complete desciption of this category is found in Appendix C.

Assessing the area required for this category is as difficult as estimating the potential value of the services to be provided. Furthermore, no space standards or inventory data were available for guidance for the Task Force at this level of detail. The only sure conviction held by the members of the Task Force prior to analysis of the data was that these functions had yet to be exploited fully.

The Task Force applied various populations as potential input measures. Because of the small area involved it would be difficult to choose an input measure from an analysis of variance alone. Because other jurisdictions have included these spaces in a category for which the input measure is full-time equivalent enrolment, the same was selected by the Task Force.

TABLE 19

COMPARISON OF PLANNING STANDARDS - MAINTENANCE AND UTILITY SPACE[1]

Percentage of Total Gross University Area

	Test Universities		Other Jurisdictions		Taylor, Lieberfeld and Heldman			Task Force Recommendation
	Available	Required	Standards[2]	Inventory	1967-68	1968-69	Recommendations	
RANGE	1.4 - 2.6	1.6 - 2.4	1.2 - 1.8[3]	-	-	-	-	
AVERAGE	1.6	2.0						2.0

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1. A complete description of the areas included in this category are found in Appendix C.
2. The standards of other jurisdictions are presented in Table 19a in Appendix A and do not include utility area while the Task Force recommendations and data contain provision for utility space.
3. The standards of other jurisdictions have been standardized to reflect gross university area.

The five test universities reported available area per full-time equivalent student ranging from 0.1 to 0.7 square feet with an average of 0.4 square feet. Required space ranged from 0.2 to 1.0, with an average of 0.7 square feet per full-time equivalent student. After consideration of the recommendation of the Task Force - Space for Education the Task Force presents the following recommendations:

1. THAT THE AREAS TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 12 OF APPENDIX C.

2. THAT THE INPUT MEASURE FOR DETERMINING ALLOCATION OF THIS CATEGORY OF SPACE BE FULL-TIME EQUIVALENT STUDENTS.

3. THAT THE STANDARD FOR THIS CATEGORY BE ESTABLISHED AT 0.8 SQUARE FEET PER FULL-TIME EQUIVALENT STUDENT.

10.5 Central Services

> Included in this category are all central areas associated with serving the supporting requirements for the activities of the university. Among these areas are all computer related facilities, printing shops, and central storage areas for supplies and other small items.

The largest and most explosive element of this category can be assumed to be computer processing areas. While the remaining areas can be considered to have been fairly constant in their demands for space over the past years the introduction of the computer on campus has resulted in increasing demands for space.

The members of the Task Force considered two populations as potential input measures. These were:

1. full-time equivalent enrolment

2. full-time equivalent faculty

Wide variations were observed in the areas per full-time equivalent faculty member. These variations were considerably wider than those resulting from the use of full-time equivalent enrolment as an input measure. Interpretation of the variations is extremely difficult, and given only the available data becomes a game of speculation. In other jurisdictions this category is generally placed with supporting facilities for which the input measure is full-time equivalent enrolment.

The five test universities reported an average available area per full-time equivalent student of 1.6 square feet for this category. The range was from 0.7 to 2.8 square feet. On their indications of required space they reported an average of 2.6 per full-time equivalent student with a range from 1.5 to 3.4. No standards or inventory data was available from other jurisdictions at this level of detail.

Therefore the Task Force, after considering the extent of this category of space, and in view of the available and required areas for the five test universities, tables the following recommendations:

1. THAT THE AREA TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 13 OF APPENDIX C.
2. THAT THE INPUT MEASURE FOR DETERMINING ALLOCATIONS FOR THIS SPACE CATEGORY BE FULL-TIME EQUIVALENT ENROLMENT.
3. THAT THE STANDARD FOR THIS FACTOR BE ESTABLISHED AT 2.6 SQUARE FEET PER FULL-TIME EQUIVALENT STUDENT.

10.6 Services to Students

Included in this category are all areas associated with the health service facilities available to students at a university. A complete description of this category is given in Appendix C.

The members of the Task Force considered full-time equivalent enrolment as the only suitable input measure for this category of space. They felt that the areas in this category were essentially a function of enrolment, and the data supports the relationship. The five test universities reported an average available area of 0.3 square feet per full-time equivalent student. They reported the same average requirement and the range for the two averages was negligible. These values are presented in Table 20 along with the available standards and inventory of other jurisdictions.

It should be noted from this table that the standards and inventory of other jurisdictions are considerably above both the available and recommended areas for Ontario institutions. It has been suggested that this is a reflection of the Ontario institutions' reliance upon adjacent health facilities. The members of the Task Force recognize this reliance but suggest, for special cases where it can be shown to be impractical, that special consideration be given. With this in view, and after examination of available and required areas for the five test universities, and the standards and inventory of other jurisdictions, the Task Force recommends:

1. THAT THE AREA TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 14 OF APPENDIX C.

TABLE 20

COMPARISON OF PLANNING STANDARDS - SERVICED TO STUDENTS(1)

Square Feet Per FTE Student

	Test Universities		Other Jurisdictions		Taylor, Lieberfeld and Heldman			Task Force Recommendation
	Available	Required	Standards	Inventory	1967-68	1968-69	Recommendations	
RANGE	0.18 - 0.32	0.28 - 0.48	1.0 - 4.0(2)	1.3 - 1.7(2)	The TLH recommendation is included in their recommendation for Special Use Facilities			0.3
AVERAGE	0.26	0.33						

1) a complete description of the areas included in this category are presented in Appendix C.

2) the standards and inventory of other jurisdictions are shown in Table 20a in Appendix A.

2. THAT THE INPUT MEASURE FOR DETERMINING ALLOCATION OF AREA FOR THIS CATEGORY BE FULL-TIME EQUIVALENT STUDENTS.

3. THAT THE STANDARD FOR THIS FACTOR BE ESTABLISHED AT 0.3 SQUARE FEET PER FULL-TIME EQUIVALENT STUDENT.

This category along with Academic Service space comprise the Taylor, Lieberfeld and Heldman classification "Special Use Facilities". The total recommendations of the Task Force represent 1.0 square feet per full-time equivalent student as compared to the TLH recommendation of 2.0 square feet.

10.7 Common Use and Student Activity Space

> Included in this category are all those areas provided for non-curricular activities of the university. Among these are lounges, student activity office space and their service areas, as well as recreational areas and small game rooms such as billiards, table tennis, etc. A complete description of this category is presented in Appendix C.

In other jurisdictions this category of space is usually combined with various areas in a space category referred to as General Use Facilities. The Task Force, as mentioned in the introduction to this chapter, desired to examine these categories at a level of detail sufficient to isolate any variances which might be lost in a more aggregate classification. Such variances were in fact found in examining the data for the five test universities for this space category.

The Task Force considered two populations as potential input measures: full-time equivalent enrolment and the total population of the university including all support staff, faculty and students. The range of space for either population was relatively wide. It was agreed that the total university population should be rejected for the following reasons. First, the members of the Task Force felt that these areas are provided primarily for the student population, and as such it would be highly desirable if the allocation of these areas could be a function of student enrolment. Secondly, an input measure using the total university population implies some form of equivalence determination. The members of the Task Force felt that a single equivalence method for support staff could not be equitable for the various patterns of organization in Ontario universities. One of the problems in such a method is the proper allocation rate for students employed by the university. Finally, since the standards of other jurisdictions are expressed in terms of full-time equivalent enrolment, it was desirable, if inter-jurisdictional comparisons were to be made, that the same measure be used.

The average available area for the five test universities was reported as 4.2 square feet per full-time equivalent student with a range from 1.6 to 6.1. The average for the required areas was 5.7 square feet per full-time equivalent student with a range from 4.2 to 7.3 square feet. Bareither and Schillinger,(10) recommend an allocation of 9.75 to 11.75 square feet per FTE student, including some provision for food service facilities. The New York(6) study reports the same standards for Illinois. It should be noted that these standards do not include the total allocations for food service facilities but exclude, for example, all residence facilities.

Therefore the Task Force after examining the available and required areas for the five test universities, and in view of the standards of other jurisdictions, table the following recommendations:

1. THAT THE AREAS TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 15 OF APPENDIX C.

2. THAT THE INPUT MEASURE FOR DETERMINING ALLOCATION OF AREAS FOR THIS CATEGORY OF SPACE BE FULL-TIME EQUIVALENT ENROLMENT.

3. THAT THE STANDARD FOR THIS FACTOR BE ESTABLISHED AT 6.2 SQUARE FEET PER FULL-TIME EQUIVALENT STUDENT.

The recommended value is the average required area for the five test universities excluding the high and low values. This changes the range for this category from 4.2 to 7.3 square feet to 5.6 to 6.8 square feet per full-time equivalent student. In the opinion of the members of the Task Force the high and low averages represented extreme values which should be excluded from the analysis.

This standard will be combined with other categories to allow a comparison with the standards of other jurisdictions in the following section.

10.8 Assembly and Exhibition Space

Included in this category are those areas designed for non-instructional dramatic, musical, devotional activities and their related service areas. Among these are theatres, auditoriums, chapels, etc. A complete description of this category is given in Appendix C.

The extent to which a university invests in this category of space may be largely an evaluation of alternative areas available. For example, the availability of a large auditorium adjacent to the campus may negate the need of the university to supply one of its own.

Inherent in such a procedure are the policies and decisions of the institution with regard to the activities demanding such facilities. For reasons such as these, Bareither and Schillinger(10) hesitate to recommend standards for this space category. The members of the Task Force, while recognizing these circumstances, propose that some provision should be made for areas of this kind. While such areas generally are not directly related to the instructional activities of the university, but are more normally associated with the extracurricular activities of the students and with community service functions of the university, some allocation should be made in view of the responsibilities of the university.

The members of the Task Force considered only full-time equivalent enrolment as an input measure for this category. As well as being used by other jurisdictions, the Task Force felt that this was the most logical measure and the best alternative to use without introducing additional complexity to the input measures already chosen.

The five test universities reported an average available area for this category of 1.4 square feet per full-time equivalent student. As might be suggested from the introduction to this section, the variance for the available areas was wide, ranging from 0.5 to 2.5 square feet per full-time equivalent student. The data for the required areas exhibited the same wide spread ranging from 0.6 to 2.9 with an average of 1.8 square feet per full-time equivalent student. No standards or inventory data for other jurisdictions were available for this category.

Therefore after examining the data for the available and required areas of the five test universities, and the recommendation of the Task Force - Space for Education, and in view of the nature of this category of space, the members of the Task Force recommend:

1. THE AREAS TO BE INCLUDED IN THIS CATEGORY BE AS DEFINED ON PAGE 16 OF APPENDIX C.

2. THE INPUT MEASURE FOR THE DETERMINATION OF THE ALLOCATION OF THESE AREAS BE FULL-TIME EQUIVALENT ENROLMENT.

3. THE STANDARD FOR THIS FACTOR BE ESTABLISHED AT 2.4 SQUARE FEET PER FULL-TIME EQUIVALENT STUDENT.

Several categories when combined correspond approximately with the space category of other jurisdications labelled "General Use Space". These are: food service space, bookstore, etc., common use and student activity space, and assembly and exhibition space. Table 21 shows the total recommentations of the Task Force along with the standards and inventory of other jurisdictions. Again the reader is warned that the space categories may not be perfectly comparable.

TABLE 21

COMPARISON OF PLANNING STANDARDS - "GENERAL USE SPACE[1]"

Per FTE Student

	Test Universities		Other Jurisdictions		Taylor, Lieberfeld and Heldman			Task Force Recommendation
	Available	Required	Standards[2]	Inventory	1967-68	1968-69	Recommendations	
RANGE	13.2 - 15.4	12.0 - 20.2	8.0 - 33.0	10.1 - 13.99	8.8 - 29.1	7.9 - 26.8		
AVERAGE	13.9	15.7					27.0	16.9

1) The data for the test universities correspond to the categories Food Service, Bookstore, etc., Common Use and Student Activity and Assembly and Exhibition Spaces. A complete description of these areas are presented in Appendix C.

2) The standards and inventory data are presented on Table 21a in Appendix A.

11. TESTING THE RECOMMENDATIONS

Previous sections have identified each of the space categories and have presented rationales for both the input measures and space standards recommended by the Task Force. Moreover, the input measures and space standards should also contribute to allocation mechanisms through which the total area generated allows each university to develop the capital resources necessary for its own particular pattern of operation. While the recommendations of the Task Force have been developed independently, it is intended that they contribute to a capital formula in which the only constraint for capital funding is the total space entitlement for each university.

At this time it is not possible to introduce an analysis of cost implications. However, the recommendations of the Task Force allow a unit cost index to be applied to the various space categories. In this way a greater flexibility will be provided than is presently available under the interim capital formula.

Table 22 presents a summary of the area generated by the recommendations of the Task Force for the five test universities. Approximately a 6% increase over available area results with one university showing an 11% decrease while the remaining four show increases of 10% to 16%. Compared to the required areas reported by the test universities an overall decrease of 4% (range from minus 12% to plus 9%) is generated from the recommendations of the Task Force. A comparison to the space entitlements of the interim capital formula is also shown but it is emphasized that only when cost components for the two formulae are included can a realistic evaluation be attempted.

Table 23 shows the effects of the Task Force recommendations for the individual space categories. The ratio of generated area to available area is intended to show conceptually at least, the impact of the recommendations in relation to presently available areas. More uniform ratios would have been obtained if required areas had been used, however no frame of reference would have been established. For example, the Task Force believes that a better utilization of classroom and laboratory facilities can be achieved and this is reflected in the decrease in space generated for this category. Similarly, the increase in athletic and recreational space reflects the perceived need for such areas.

TABLE 22

COMPARISONS OF TASK FORCE RECOMMENDATIONS

UNIVERSITY	GENERATED AREA/ AVAILABLE AREA	GENERATED AREA/ REQUIRED AREA	GENERATED AREA/INTERIM CAPITAL FORMULA AREA
"A"	1.12	0.91	1.01
"B"	1.10	1.02	1.09
"C"	0.89	0.88	1.14
"D"	1.11	1.09	1.06
"E"	1.16	0.95	1.16
TOTAL	1.06	0.96	1.07

NOTE:

(1) The generated area is obtained by applying the appropriate values for the input measures for 1970-71 for the five test universities to the recommendations of the Task Force - Space and Utilization. The generated area does not include provision of space for health science or education programmes.

(2) The required area is that area thought to be required by the five test universities to efficiently carry out the instructional activities of 1970-71.

(3) Interim capital formula area is the space entitlement generated by the actual student enrolment for 1970-71. This does not include provision for support of health science or education programmes.

TABLE 23

COMPARISON BY SPACE CATEGORY TASK FORCE

RECOMMENDATIONS AND AVAILABLE SPACE

SPACE CATEGORY	GENERATED AREA/ AVAILABLE AREA	CONTRIBUTION OF CATEGORY TO NET CHANGE (%)
Classroom	0.83	-33.24
Laboratory - Undergraduate	0.87	-29.47
Laboratory - Faculty & Graduate	0.97	-6.66
Library - Study & Service	1.15	17.05
Library - Stacks	1.22	16.84
Instructional - Office & Related	1.00	-0.01
Athletic & Recreational	1.82	65.35
Food Service	0.86	-14.45
Bookstore	1.31	5.99
Other Office & Related	1.11	12.40
Academic Services	1.96	5.47
Central Services	1.41	10.55
Services to Students	1.07	0.29
Common use & Student activity	1.37	23.48
Assembly & Exhibition	1.60	12.53
Maintenance & Utility	1.16	13.90
TOTAL	1.06	100.00

The second column of Table 23 (contribution of category to net percentage change) is presented to allow an evaluation of the impact of the recommendations of the individual space categories on the net increase of 6% of available area. The 76% increase in academic services area is shown to contribute only 4.0% of the net change. Likewise the decrease in classroom and laboratory areas are offset by the increase in athletic and recreational space. In this way the sensitivity of the 6% net increase over available areas can be evaluated for each space category.

Table 24 shows the percentage distribution across the space categories for both available and generated space for each of the five test universities. From this table it should be noted that the recommendations of the Task Force generate a space entitlement which in some space categories is quite distinct from the available areas. This redistribution effect of the Task Force's recommendations is largely a result of attempting to produce not only space factors which have some relation to available inventory but also which have embedded some degree of utilization standards.

Beyond being equitable in the total space generated a further desirable characteristic is that the set of standards be consistent for each application. Because a further weight (a cost index) is to be applied, serious cost implications could result if the standards were inconsistent even though the total space allocations were approximately equal. Consistency for some space categories can be evaluated from Table 24. It should be emphasized, however, that comparison of percentage distributions mask any scale factor. In both classroom space and library stack space the Task Force recommendations explicitly identified a scale factor.

The members of the Task Force believe that both the redistribution effect of the recommendations as well as an evaluation of the consistency of the space factors (given the various patterns of operation within the fourteen provincially-assisted universities in Ontario) may necessitate a phased approach in implementation of the Task Force's recommendations. However, such an approach is properly a consideration in the determination of the detailed mechanism of implementation of the formula.

TABLE 24

COMPARISONS OF AVAILABLE AND GENERATED AREAS BY UNIVERSITY AND SPACE CATEGORY

Space Category	Percentage of Available Space					Percentage of Generated Space				
	University					University				
	A	B	C	D	E	A	B	C	D	E
Classroom	16.9	8.5	10.0	13.4	17.6	9.9	9.5	8.2	11.3	12.7
Laboratory - Undergraduate	9.9	12.9	19.8	16.9	10.8	10.4	9.5	19.1	10.0	10.7
Laboratory - Grad. & Faculty	13.0	21.1	11.9	9.5	4.1	11.9	15.5	15.0	8.9	3.7
Library - Study & Service	6.7	5.7	7.4	8.0	9.3	8.4	7.3	5.7	8.8	8.1
Library - Stacks	6.2	4.7	4.0	3.5	9.9	5.7	6.2	5.6	4.6	7.7
Instructional Office	14.7	12.6	14.2	15.3	14.2	12.7	13.3	13.8	13.6	14.9
Athletic & Recreational	4.9	6.2	6.8	3.5	-	9.4	8.1	6.5	10.2	9.7
Food Service	8.8	5.9	4.8	6.7	7.2	5.9	5.0	4.6	5.8	5.7
Bookstore	0.8	0.9	2.0	1.1	1.9	1.6	1.4	1.1	1.8	1.7
Other Office	4.4	5.9	9.5	8.7	9.6	8.0	6.9	5.5	8.7	8.3
Academic Services	0.3	0.3	0.1	0.7	0.4	0.7	0.6	0.5	0.8	0.7
Central Services	2.5	1.4	0.5	1.8	3.0	2.3	2.0	1.6	2.5	2.4
Service to Students	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.3
Common Use & Student Activity	2.9	5.4	2.1	6.7	1.8	5.6	4.8	3.9	6.1	5.8
Assembly and Exhibition	2.7	0.4	1.2	0.6	1.7	2.2	1.9	1.3	2.3	2.2
Maintenance & Utility	4.9	7.8	5.5	3.2	8.2	5.0	7.9	7.3	4.4	5.4

BIBLIOGRAPHY

1. Ontario Universities Physical Resources Survey (Volumes One, Two and Three), Taylor, Lieberfeld and Heldman, October, 1971.

2. Ohio Basic Data Series - Higher Education, Ohio Board of Regents, June, 1971.

3. Higher Education Facilities Planning and Management Manuals, Planning and Management Systems Division Western Interstate Commission for Higher Education, Boulder, Colorado, November 1970.

4. Statistical Information Related to Departmental Space Priorities (Report 25), Office of Institutional Research, University of Calgary, June 1970.

5. Statistical Information Related to Departmental Space Priorities (Report 18), Office of Institutional Research, University of Calgary, May 1970.

6. Planning Standards, Inventory, and Utilization Data for Higher Education Facilities in Twenty-Seven States, The University of the State of New York, State Education Department, Albany, New York, February, 1970.

7. Guidelines for Facility Planning, Louisiana State University, Baton Rouge, Louisiana, November 1969.

8. Theoretical Maximum Scheduling and Utilization of Classrooms, H.D. Bareither, American Association of Collegiate Registrars and Admissions Officers, April 1969.

9. A Theoretical Basis for University Planning, Land Use and Built Form Studies, Cambridge University School of Architecture, Cambridge, England, April 1968.

10. University Space Planning, H.D. Bareither and J.L. Schillinger, University of Illinois Press, Urbana, Chicago, 1968.

11. Indiana Facilities Utilization Survey for Colleges and Universities, Indiana Advisory Commission on Academic Facilities, 1968.

12. Indiana's Four State-Supported Universities 1967-69 Capital Appropriations Study, Purdue University, April 1966.

13. College and University Facilities Survey - Part 3: Inventory of College and University Physical Facilities, United States Department of Health, Education and Welfare, 1965.

14. Space Inventory and Utilization, University of Washington, June 1965.

15. A Proposed Method for Determining Space Needs, The University of the State of New York, State Education Department, Albany, New York.

16. Facilities Inventory and Utilization: Summary Report, Ohio Board of Regents, Columbus, Ohio, June 1971.

17. Report of the Minister of University Affairs of Ontario: 1969-70, Department of University Affairs, Queen's Park, Toronto, Ontario, 1970.

18. Report of the Minister of University Affairs of Ontario: 1967-68, Department of University Affairs, Queen's Park, Toronto, Ontario, 1968.

19. Financing University Programs in Education, CUA/COU Joint Subcommittee on Finance/Operating Grants, Toronto, 1971.

20. Letter from Dr. D.T. Wright, Chairman of CUA, to Dr. D. Dunton, formerly Chairman of COU, January 10, 1967.

21. Report of the Committee on University Affairs of Ontario: 1969-70, Committee on University Affairs, Queen's Park, Toronto, Ontario, 1970.

22. Guidelines for Facilities Planning and a Capital Formula - Draft Report, I. Thompson, Council of Ontario Universities, Toronto, Ontario, August 1970.

23. Report of the Task Force - Building Costs

24. Report of the Task Force - Education (Capital)

25. Report of the Task Force - Health Sciences (Capital)

26. Library Statistics of Colleges and Universities: Fall 1968, National Center for Educational Statistics, United States Department of Health, Education and Welfare, Washington, D.C., February 1969.

27. Methodology for Projecting Space Requirements for Faculties and Schools, Fort Garry Campus, University of Manitoba, Office of Vice-President (Planning).

REPORT OF THE
TASK FORCE - SPACE AND UTILIZATION

Appendices

APPENDIX A

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE

Square Feet per Full-time Equivalent Student

Planning Standards - Other Jurisdictions

New York survey(6):

New Jersey - 10.8 - 13.0(i)
Florida - 10.1
WICHE(3) - 12.0(ii)

Inventory - Other Jurisdictions

New York survey(6):

Arkansas - 15.1
Delaware - 13.2
Illinois - 16.5
Indiana - 13.1
New York - 14.4
Kansas - 9.1 - 24.6
Ohio - 6.0 - 24.0

NOTE: The reference numbers refer to publications listed in the bibliography.

i per full-time student
ii includes service facilities

TABLE 1a

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE

Square Feet per Station

Planning Standards - Other Jurisdictions

WICHE(3)	- 17.5(i)
Louisiana(7)	- 15.0
Indiana(12)	- 15.0(i)
Indiana(11)	- 15.0
Bareither(10)	- 15.0(i)

New York(6):

Arkansas	- 15.0
Colorado	- 16.1(i)
Florida	- 15.0 - 18.0
Illinois	- 15.0
Indiana	- 15.0
Iowa	- 10.0 - 18.0
Kentuchy	- 9.0 - 17.0
Nebraska	- 15.0
Ohio	- 10.0 - 20.0
Oklahoma	- 16.0
South Carolina	- 15.0
South Dakota	- 12.0 - 20.0
Texas	- 15.0
Wisconsin	- 16.5(i)

Inventory - Other Jurisdictions

U.S. average(13)	- 15.4(i)
Indiana(11)	- 14.4

New York(6):

Illinois	- 16.3
Indiana	- 14.4
South Dakota	- 14.7
Wisconsin	- 12.0 - 15.0

NOTE: The reference numbers refer to publications listed in the bibliography.

i factor known to include provision for service space.

TABLE 2a

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE

Derived Capacity Utilization Coefficient

Planning Standards - Other Jurisdictions

New York Survey(6):

Arkansas	- 40
California	- 50
Colorado	- 44
Illinois	- 40
Indiana	- 33
Iowa	- 40
Kentuchy	- 45
Montana	- 40
Nebraska	- 43

New York Survey(6):

Oregon	- 40
South Carolina	- 40
South Dakota	- 44
Texas	- 36
Virginia	- 40
West Virginia	- 44
Wisconsin	- 44

Louisiana(7)	- 40
Bareither(8)	- 40
WICHE(3)	- 43

Inventory - Other Jurisdictions

New York Survey(6):

Arkansas	- 33
Florida	- 28
Illinois	- 30
Indiana	- 30
Kentucky	- 16
South Dakota	- 29
West Virginia	- 35
Calgary(4)	- 31(i)
Purdue University(12)	- 43

NOTE: Except where noted all data has been normalized to a 45 hour week.
The reference numbers refer to publications listed in the bibliography.

i measured over a 54 hour week.

TABLE 3a

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE

Derived Capacity Utilization Coefficient

Jurisdictions employing a sliding scale:

FLORIDA

Type of Institution	Capacity Utilization Coefficient
Junior Colleges	40
Colleges	40
Universities	44

NEW YORK

Degree Level of Institution	Capacity Utilization Coefficient Size of Institution (number of students) 0 - 999	1000 - 2499	2500 - 4999	5000 +
Associate Degree	38	41	44	48
Baccalaureate and Masters Degree	35	38	41	44
Doctoral Degree	33	35	38	41

OKLAHOMA

Enrolment	Capacity Utilization Coefficient
Less than 1,000	40
1,000 - 3,000	42
More than 3,000	44

NOTE: except where noted all data has been normalized to a 45 hour week.

TABLE 3b

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE

Square Feet per Student Contact Hour

Planning Standards - Other Jurisdictions

New York(6):

Arkansas - 0.83
California - 0.67
Colorado - 0.80
Delaware(i) - 0.67 - 1.00
Florida(i) - 0.99(iv) - 1.07
Illinois - 0.83
Indiana - 1.00
Iowa(i) - 0.55 - 1.00
Kentucky(i) - 0.44 - 0.83
Missouri(iii) - 0.83
Montana - 0.83
Nebraska - 0.77
Oklahoma(i) - 0.80 - 0.89

New York(6):

South Carolina - 0.83
South Dakota(i) - 0.63 - 1.00
Wisconsin - 0.82

Louisiana(7) - 0.83
Bareither(8) - 0.83
WICHE(3) - 0.90

Inventory - Other Jurisdictions

New York(6):

Arkansas - 2.02
Delaware - 1.00
Illinois(iii) - 1.22
Indiana - 0.80 - 1.97
Kansas - 0.74 - 1.71
North Carolina - 1.12 - 1.68
Oklahoma - 0.80
South Dakota - 1.11

NOTE: The reference numbers refer to publications listed in the bibliography.

i see Table 6
ii data normalized to 45 hour week to calculate this factor
iii excluding service
iv mid-range of the junior colleges.

TABLE 6a

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE

Square Feet per Student Non Laboratory Contact Hour

Jurisdictions employing a sliding scale:

DELAWARE

Enrolment	Square Feet per Student Contact Hour
Less than 1,000	1.00
1,000-3,000	0.83
More than 3,000	0.67

FLORIDA

Type of Institution	Square Feet per Student Contact Hour
Junior Colleges (i)	0.99
Colleges	0.89
Universities	0.76

IOWA

Class Size	Square Feet per Student Contact Hour
Less than 35	1.00
35 - 60	0.83
61 - 150	0.66
More than 150	0.55

KENTUCKY

Room Size	Square Feet per Student Contact Hour
20 Stations/Classroom	0.83
30 stations/Classroom	0.74
50 stations/Classroom	0.68
125 stations/Classroom	0.49
250 stations/Classroom	0.44

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i mid-range of the junior colleges

TABLE 6b

Continued

COMPARISON OF PLANNING STANDARDS - CLASSROOM SPACE

Square Feet per Student Non-Laboratory Contact Hour

Jurisdictions employing a sliding scale (continued):

SOUTH DAKOTA

Classroom Type	Square Feet per Student Contact Hour
Fixed seat	0.63
Movable seat	0.75
Seminar	1.00

NEW YORK

Degree Level	Size of Institution (number of students)			
	0.999	1000-2499	2500-4999	5000 +
Associate Degree	0.95	0.89	0.80	0.73
Baccalaureate and Masters	1.04	0.93	0.83	0.75
Doctoral	1.09	0.98	0.87	0.78

COMPARISON OF PLANNING STANDARDS - LABORATORY (UNDERGRADUATE)

Square Feet per FTE Student

Planning Standards - Other Jurisdictions(i)

New York Survey(6):

New Jersey - 5.2 - 46.9(ii)

WICHE(3) - 16.0(iii)

Inventory - Other Jurisdictions(i)

New York Survey(6):

Arkansas - 12.2
Delaware - 39.0
Illinois - 13.7
Indiana - 28.3

New York Survey(6):

Kansas - 16.3
Missouri - 22.7
New Jersey - 11.9
New York - 36.3

NOTE: The reference numbers refer to publications listed in the bibliography.

i. for a more detailed listing please refer to the publications cited in the bibliography

ii. based on full-time enrolment not FTE

iii. includes service space

TABLE 7a

COMPARISON OF PLANNING STANDARDS - LABORATORY (UNDERGRADUATE)

Square Feet per Station

Planning Standards (single valued variable) - Other Jurisdictions

New York Survey:(6)

Arkansas - 50
Florida - 55
Indiana - 67.4
Nebraska - 30
Wisconsin(i) - 71.5

Planning Standards (function of the field of study) - Other Jurisdictions(ii)

New York Survey:(6)

California - 30 (MPE, Social Sciences and Professions) - 200 Junior Colleges)
Illinois - 30 (Liberal Arts) - 250 Physical Education)
Iowa - 20 (Science and Humanities) - 120 (Engineering and Agriculture)
Ohio - 35 (Drafting) - 75 (Graduate)
Oklahoma - 38 (Technical-Vocational) - 144 (MCPE sciences)
South Carolina - 32 - 160
Texas - 30 (Music) - 60 Engineering and Art)

WICHE(3) - 30 (Business and Management) - 200 (Engineering)(i)
Bareither(10) - 30 (Sociology) - 250 (Physical Education)(i)
Louisiana(7) - 20 (Languages) - 150 (Agricultural Engineering)(i)

Planning Standards (function of the type of institution or unknown)- Other Jurisdictions(ii)

New York Survey:(6)

Colorado - 47.0 - 70.1
Kentucky - 35.0 - 60.0
South Dakota - 30.0 - 150.0

New York(15) - 40.0 - 80.0

Inventory - Other Jurisdictions

New York Survey:(6)

Colorado - 33 - 69
Illinois - 33.7 - 69.7 (average of 47.8)
Indiana - 38.3
South Dakota - 29.1 - 40.3 (average of 38.1)
Wisconsin - 41.4 - 43.3

NOTE: The reference numbers refer to publications listed in the bibliography.

i. includes service space.
ii. for a more detailed listing please refer to the publication cited in the bibliography.

TABLE 7 b

COMPARISON OF PLANNING STANDARDS - LABORATORY (UNDERGRADUATE)

Scheduled Hours per Week

Planning Standards (single valued variable) - Other Jurisdictions

New York Survey:(6)

Arkansas - 20
Indiana - 20
Iowa - 20
Kentucky - 22
Montana - 20
Nebraska - 20
Ohio - 20
Oklahoma - 24

Louisiana(7) - 20

New York Survey:(6)

Oregon - 20
South Carolina- 20
South Dakota - 24
Texas - 20
Virginia - 20
West Virginia - 20
Wisconsin - 24

Planning Standards (function of the field of study) - Other Jurisdictions(i)

New York Survey:(6)

California- 20 - 25
Florida - 18 - 24
Illinois - 20 - 24

Planning Standards (function of the type of institution or unknown) - Other Jurisdictions(i)

New York Survey:(6)

Colorado - 15 - 20

New York(15) - 20 - 25

Inventory - Other Jurisdictions

New York Survey:(6)

Arkansas - 8.7 - 13.4
Florida - 3.4 - 14.0 (average of 9.1)
Illinois - 14.1 - 30.8 (average of 16.6)
Indiana - 17.5

New York Survey:(6)

Kentucky - 9.2 - 25.0
South Dakota - 8.4 - 15.8 (average of 12.8)
West Virginia - 13.0 - 78.0

NOTE: The reference numbers refer to publications listed in the bibliography.

i. for a more detailed listing please refer to the publications cited in the bibliography.

TABLE 7c

COMPARISON OF PLANNING STANDARDS - LABORATORY (UNDERGRADUATE)

Seat Utilization Rate

Planning Standards (single valued variable) - Other Jurisdictions

New York Survey:(6)

Arkansas - 80
Colorado - 80
Florida - 80
Illinois - 80
Indiana - 80
Iowa - 80
Kentucky - 85
Montana - 80
Nebraska - 80

Louisiana(7) - 80

New York Survey:(6)

Oklahoma - 80
Oregon - 80
South Carolina - 80
South Dakota - 80
Texas - 60
Virginia - 80
West Virginia - 80
Wisconsin - 67

Planning Standards (function of the field of study) - Other Jurisdictions(i)

New York Survey:(6)

California - 80 - 85

Planning Standards (function of the type of institution or unknown) - Other Jurisdictions(i)

New York(15) - 72.5 - 85.0

Inventory - Other Jurisdictions

New York Survey:(6)

Arkansas - 54.0 - 71.4
Florida - 57.9 - 66.4 (average of 59.9)
Illinois - 70.0 - 91.4 (average of 74.3)
Indiana - 64
Kentucky - 13.0 - 21.0 (average of 19.0)
South Dakota - 66.6 - 74.4 (average of 71.1)
West Virginia - 65.9 - 93.1
Wisconsin - 74.6 - 75.2

NOTE: The reference numbers refer to publications listed in the bibliography.

i. for a more detailed listing please refer to the publications cited in the bibliography.

TABLE 7d

COMPARISON OF PLANNING STANDARDS - LABORATORY (UNDERGRADUATE)

Square Feet per Student Laboratory Contact Hour

Planning Standards (single valued variable) - Other Jurisdictions

New York Survey:(6)

Arkansas - 3.13
Indiana - 4.50
Missouri - 3.75(iii)
Nebraska - 1.88
Wisconsin - 3.72

Planning Standards (function of the type, size of institution or unknown) - Other Jurisdictions(i)

New York Survey:(6)

Colorado - 2.94 - 5.84(ii)
Delware - 3.00 - 4.50
Florida - 2.87 - 3.82
Kentucky - 2.06 - 3.21
South Dakota - 1.56 - 2.34

New York(15) - 1.88 - 5.08

NOTE: The reference numbers refer to publications listed in the bibliography.

i. for more detailed information the reader is referred to the specific publication cited in the bibliography.

ii. known to include service space.

iii. known to exclude service space.

TABLE 8a

COMPARISON OF PLANNING STANDARDS - LABORATORY (UNDERGRADUATE)

Square Feet per Student Laboratory Contact Hour

Planning Standards (function of the field of study) - Other Jurisdictions(i)

New York Survey:(6)

California	1.40 - 4.05	1.40 - 6.90
Illinois*	1.56 - 6.25	1.67 - 11.00
Iowa**	1.25 - 6.00	1.38 - 7.50
Montana	2.19 - 4.38	2.19 - 11.52
Oklahoma	2.50 - 3.12	3.90 - 7.50
Texas	2.80 - 4.80	3.60 - 4.80
Louisiana(7)***	1.25 - 4.38(ii)	3.13 - 9.38
Bareither(10)****	2.00 - 6.25	2.00 - 10.00

* Agriculture - 3.39 - 10.00
** Agriculture - 1.38 - 7.50
*** Agriculture - 2.19 - 9.38
**** Agriculture - 4.06 - 10.00(iii)

NOTE: The reference numbers refer to publications listed in the bibliography.

i. for more detailed information the reader is referred to the specific publication cited in the bibliography.

ii. known to include service.

iii. based on a 20 hour week.

TABLE 8b

COMPARISON OF PLANNING STANDARDS - LABORATORY (UNDERGRADUATE)

Square Feet per Student Laboratory Contact Hour

Inventory - Other Jurisdictions

New York Survey:(6)

Arkansas - 1.17
Delaware - 5.13
Illinois - 4.48
Indiana - 5.12
Kansas - 2.94
North Carolina - 7.03
South Dakota - 4.18
Wisconsin - 2.77

NOTE: The reference numbers refer to publications listed in the bibliography.

TABLE 8c

COMPARISON OF INVENTORY - LIBRARY SPACE

Square Feet per Full-time Equivalent Enrolment

Inventory - Other Jurisdictions

New York Survey(6):

Illinois - 5.1
Indiana - 12.0
Kansas - 8.6
Missouri - 11.5
New Jersey - 7.5
New York - 12.1

Ohio(2) - 2-13

Ohio(16):

private universities and colleges - 15.4

public universities - 7.1

Note: The reference numbers refer to publications listed in the bibliography.

TABLE 10a

COMPARISONS OF PLANNING STANDARDS - LIBRARY STATIONS

Library Supplied for Percent of Population

New York (6)

California - 20% of students
Deleware - 25% of students
Iowa (St. U.) - 25% of students
South Carolina - 20% of students
Wisconsin - 20% of students

NOTE: The reference numbers refer to publications listed in bibliography.

TABLE 11a

COMPARISON OF PLANNING STANDARDS - LIBRARY SPACE

Library Study Area per Unit Population

New York survey(6):
Colorado - 6.25 square feet per FTE student
Delaware - 5.0 square feet per student
Illinois - 7.5 square feet per FTE student
15.0 square feet per FTE faculty
Indiana - 3.5 square feet per FTE undergraduate
7.0 square feet per FTE law student
7.0 square feet per FTE graduate
Iowa - 7.5 square feet per student
Missouri - 8.33 square feet per FTE student
Montana - 5.0 square feet per FTE lower division student
7.0 square feet per FTE upper division student
9.0 square feet per FTE graduate
Oklahoma - 5.0 square feet per FTE lower division student
6.25 square feet per FTE upper division student
7.5 square feet per FTE graduate
South Carolina - 6.25 square feet per FTE student
South Dakota - 5.0 square feet per FTE student
Wisconsin - 5.0 square feet per undergraduate student
11.3 square feet per graduate student

Louisiana(7) - 6.25 square feet per undergraduate
10.0 square feet per master's student
13.3 square feet per doctoral student and faculty

Note: The reference numbers refer to publications listed in the bibliography.

TABLE 12a

Continued

COMPARISON OF PLANNING STANDARDS - LIBRARY SPACE

Library Study Area per Unit Population

Planning Standards - Other Jurisdictions

WICHE(3) - 7.6 square feet per FTE lower division student
6.7 square feet per FTE upper division student
10.4 square feet per FTE masters student
14.3 square feet per FTE doctoral student
15.0 square feet per FTE faculty

Bareither(10) - 7.5 square feet per FTE undergraduate student
7.5 square feet per headcount beginning graduate student
7.5 square feet per headcount advanced graduate student (in those fields of study with high research requirements)
15.0 square feet per headcount advanced graduate student (in those fields of study with low research requirements)
15.0 square feet per FTE faculty (in those fields of study with low research requirements)
3.0 square feet per FTE faculty (in those fields of study with high research requirements)

Note: The reference numbers refer to publications listed in the bibliography.

COMPARISON OF PLANNING STANDARDS - LIBRARY STACK SPACE

Square Feet per Equivalent Volume

Planning Standards - Other Jurisdictions(i)

New York(6):		
Arkansas Illinois New York(11)	0-150,000 volumes	0.10
	150,000-300,000 volumes	0.09
	300,001-600,000 volumes	0.08
	600,000 + volumes	0.07
California		0.10
Colorado		0.08
Delaware		0.10
Indiana		0.10
Iowa		0.10
Kansas		0.10
Missouri		0.07
Montana		0.10
Ohio		0.08
Oklahoma		0.07
South Carolina		0.08
South Dakota		0.08
Wisconsin		0.10
Bareither(10)	0-150,000 volumes	0.10
	150,001-300,000 volumes	0.09
	300,001-600,000 volumes	0.08
	600,000 + volumes	0.07
Louisiana(7)	0-150,000 volumes	0.10
	150,001-300,000 volumes	0.09
	300,001-600,000 volumes	0.08
	600,001-1,000,000 volumes	0.07
	1,000,000 + volumes	0.06
WICHE(3)		0.08

NOTE: The reference numbers refer to publications listed in the bibliography.

i all standards have been rounded to two significant digits.

TABLE 13a

COMPARISON OF PLANNING STANDARDS - LIBRARY SERVICE SPACE

Various Input Measures

Planning Standards - Other Jurisdictions

- New York(6):
  - California - 400 square feet plus 140 per FTE library staff
  - Colorado - 25 percent of stack plus study space
  - Delaware - 140 square feet per library staff
  - Illinois - 25 percent of study space
  - Indiana - 32 percent of study space
  - Iowa - 19 percent of stack plus study space
  - Missouri - 25 percent of stack plus study space
  - Oklahoma - 25 percent of stack plus study space
  - South Carolina - 20 percent of stack plus study space
  - Wisconsin - 135 square feet per library staff
- Bareither(10) - 25 percent of study space
- Louisiana(7) - 25 percent of study space
- New York(15) - 200 square feet per FTE library staff plus a provision for office space
- WICHE(3) - 25 percent of stack plus study space

NOTE: The reference numbers refer to publications listed in the bibliography.

TABLE 14a

COMPARISON OF PLANNING STANDARDS - OFFICE SPACE

Square Feet per FTE Student

Planning Standards - Other Jurisdictions

New York(6):

Florida	-	13.7 - 17.7
Kentucky	-	14.0 - 40.0
New Jersey	-	13.2 - 18.9

Inventory - Other Jurisdictions

New York(6):

Delaware	-	24.8
Indiana	-	22.2
Kansas	-	17.9 - 19.3
New Jersey	-	9.5 - 13.4
New York	-	11.3 -129.5

Note: The reference numbers refer to publications listed in the bibliography

TABLE 16a

COMPARISON OF PLANNING STANDARDS - OFFICE SPACE

Square Feet per FTE Staff

Planning Standards - Other Jurisdictions

New York (6):

California	130
Illinois	135
Missouri	125
Montana	160
Ohio	110
South Carolina	140
South Dakota	120
Texas	140

Inventory - Other Jurisdictions

New York (6):

Illinois	146
South Dakota	118.1

Note: The reference numbers refer to publications listed in the bibliography

TABLE 17a

COMPARISON OF PLANNING STANDARDS - OFFICE AND RELATED SPACE

Square Feet per FTE Staff

Planning Standards - Other Jurisdictions

New York(6):

Colorado	- 168
Delaware	- 140
Missouri	- 156
Wisconsin	- 135
University of Manitoba (27)	- 135
Bareither(10)	- 135

Note: The reference numbers refer to publications listed in the bibliography

TABLE 17b

PLANNING STANDARDS - OTHER JURISDICTIONS

ATHLETIC AND RECREATIONAL AREAS

	NASF
Bareither(10)	12.1/FTE Undergraduate 3.0/FTE Graduate 12.1/15% FTE Staff
Illinois(6)	12.1/FTE Undergraduate plus allowances for staff and graduates
Louisiana(7)	12.1/FTE Undergraduate 3.0/FTE Graduate 12.1/15% FTE Staff
S. Carolina(6)	10.0/FTE Student

NOTE: Reference numbers refer to publications listed in the bibligraphy

TABLE 18a

PLANNING STANDARDS - PHYSICAL PLANT

PERCENT OF GROSS UNIVERSITY AREA

New York(6)	
Illinois	1.32
South Carolina	1.2-1.8
Missouri	7.5 (of general and academic areas)
Bareither(10)	1.32

NOTE: The reference numbers refer to publications listed in the bibliography. All standards (except Missouri) have been normalized to percentage of gross university area by applying assignable to gross ratio reported by Taylor, Lieberfeld and Heldman(1) for the Ontario university

TABLE 19a

COMPARISON OF PLANNING STANDARDS - HEALTH SERVICES

Square Feet per FTE Student

Planning Standards

New York(6)

Illinois - 1.5-4.0 based on total enrolment

South Carolina - 1.5-4.0 based on total enrolment

Louisiana(7) - 1.0 (plus allowances for wards)

Bareither(10) - 0.6-4.0 based on total enrolment and need for infirmary

Inventory

New York

Indiana - 1.3

Missouri - 1.7

NOTE: The numbers refer to references listed in the bibliography.

TABLE 20a

COMPARISON OF PLANNING STANDARDS - GENERAL USE SPACE

Square Feet per FTE Student

Standards

New York(6)	
Florida	33.0
Illinois	10.75 - 15.25 (plus additional food service)
South Carolina	10 - 15
Louisiana(7)	8 - 15 (plus additional food service)
Bariether(10)	10.75 - 15.25 (plus additional food service)

Inventory

New York(6)	
Florida	13.99
Indiana	10.1
Missouri	12.0

NOTE: The reference members refer to publications listed in the bibliography

TABLE 21a

APPENDIX B

MEMBERSHIP OF THE TASK FORCE

Mr. Lawrence Macpherson (Chairman) - Queen's University
Mr. Robert Crandall (Assistant to the Chairman) - Queen's University
Mr. John Bell - McMaster University
Mr. Derek Jamieson - Guelph University
Dr. Ross Love - Carleton University
Mr. Hans Schulz - University of Western Ontario
Mr. Terence Varcoe - Brock University

RESOURCE PERSONNEL

Mr. Ivor Thompson (Secretary to December 31, 1971) - Council of Ontario Universities
Mr. John Long (Secretary from January 1, 1972) - Council of Ontario Universities
Mr. John Blums - McMaster University
Mr. Kenneth Collins - Carleton University
Mr. Glen Harris - University of Western Ontario
Mr. Ray Woodfield - Brock University
Mr. George Zylawy - Guelph University

TERMS OF REFERENCE

(1) the Task Force will have as its objective the development of a space and utilization guide which, incorporated with the appropriate cost data, would establish a method of allocating capital funds to the Ontario universities.

(2) to review the document *Guidelines for Facilities Planning and a Capital Formula*, critiques received, and material from other jurisdictions and to produce a revised space and utilization guide for testing purposes.

(3) to test the space and utilization guide at the sample of five universities (Guelph, Carleton, McMaster, Western and Brock).

(4) to revise the space and utilization guide on the basis of the tests conducted and other pertinent information which might be received.

(5) to submit the revised proposal for a space and utilization guide to the universities for comment.

(6) to prepare a final version of a space and utilization guide for submission to COU.

(7) the Task Force shall be responsible to the Committee on Capital Financing.

APPENDIX C

1. CLASSROOM FACILITIES (Lecture, Seminar and Tutorial)

Definition: A room used by classes which do not require specialized equipment for student use or a room which directly serves a classroom as an extension of the activities of the classroom.

Description: Included in this category are rooms generally referred to as lecture rooms, tutorial rooms, seminar rooms, and general purpose classrooms. A Classroom may be equipped with tablet arm chairs (fixed to the floor, joined together in groups, or flexible in arrangement), tables and chairs (as in a seminar room), or similar types of seating. A Classroom may be furnished with special equipment appropriate to a specific area of study if this equipment does not render the room unsuitable for use by classes in other areas of study.

Included in this category are projection rooms, cloak rooms, preparation rooms, closets, storage, and non-scheduled computation rooms if they serve a classroom.

Limitations: This category does NOT include conference rooms, auditoriums, or laboratories. Conference rooms are distinguished from seminar rooms on the basis of primary use; a room with tables and chairs which is used primarily for meetings (as opposed to classes) is a Conference Room. Auditoriums are distinguished from lecture rooms on the basis of primary use; a large room with seating oriented toward some focal point which is used for dramatic or musical productions, or for general meetings is an Assembly Facility (i.e., an auditorium normally used for other than scheduled classes). Laboratories are distinguished from classrooms on the basis of equipment in the room and by its limited use; a room with specialized equipment such as laboratory benches, typewriters, desk calculators, drafting tables, musical equipment, (instructional) shop equipment, etc., which is used for instructional purposes is a Laboratory.

This category does NOT include projection rooms, cloak rooms, preparation rooms, closets, storage, and computation rooms, if such rooms serve laboratories, conference rooms assembly facilities, etc. A projection booth in an auditorium is classified as Assembly Facilities Service.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

lecture-theater	11000
regular classrooms	12000
seminar rooms	13000
service area	17000
computation room	18000
other	19000

2. LABORATORY (undergraduate)

Definition: A room used by classes which require special-purpose equipment for student participation, experimentation, observation, or practice in a field of study, or a room which serves a laboratory as an extension of the activities of the laboratory.

Description: A Laboratory is designed and/or furnished with specialized equipment to serve the needs of a particular area of study for group instruction in regularly scheduled classes. The design and/or equipment in such a room normally precludes its use for other areas of study. Included in this category are rooms generally referred to as teaching laboratories, instructional shops, typing laboratories, drafting rooms, music practice rooms, language laboratories, studios, computation laboratories, laboratory display rooms (including museums and art galleries which serve departments), and similar specially designed and/or equipped rooms IF they are used primarily for group instruction in regularly scheduled classis.

Included in this category are balance rooms, controlled environment rooms, stock rooms, dark rooms, equipment issue rooms, animal holding rooms, greenhouses, computation rooms, service shops (including areas such as machine shops and glass blowing areas which serve a laboratory), and similar facilities which serve a laboratory.

Limitations: This category does NOT include rooms generally referred to as research laboratories. It does NOT include gymnasiums, pools, drill halls, teaching clinics, demonstration houses, and similar facilities which are included under other categories.

This category does NOT include balance rooms, controlled environment rooms, stock rooms, dark rooms, animal holding rooms, greenhouses, computation rooms, service shops etc. which do not serve a Laboratory.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

project space-undergraduate	20430
class laboratories	21000
special class laboratories	22700
large-scale equipment*	23000
small-scale equipment*	24000
suites of facilities*	25000
studios and shops*	26000
service*	27000
demonstration facilities	67000
field service facilities	69000

* that portion which is applicable to Laboratory (undergraduate) space.

3. LABORATORY (Graduate and Faculty)

Definition: A room used for laboratory applications, research, and/or training in research methodology which requires special-purpose equipment for staff and/or student experimentation or observation or a room which directly services a laboratory of this type as an extension of the activities of the laboratory.

Description: Included in this category are rooms generally referred to as research laboratories, or studios and music practice rooms for work at the graduate level.

Also included in this category are balance rooms, controlled environment rooms, stock rooms, dark rooms, animal rooms, greenhouses, laboratory service shops (machine shops, glass blowing), etc. which serve a Laboratory of this type.

Limitations: This category does NOT include rooms generally referred to as teaching laboratories.

This category does NOT include balance rooms, controlled environment rooms, stock rooms, dark rooms, animal rooms, greenhouses, etc., which serve a Laboratory (undergraduate).

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

project space - faculty	20100
- other professional	20200
- research assistant	20410
- other graduate	20420
- technical staff	20500
- other	20900
large-scale equipment*	23000
small-scale equipment*	24000
suites of facilities*	25000
studios and shops*	26000
service*	27000

* that directly serve laboratories in this category

4. INSTRUCTIONAL STAFF OFFICES and RELATED SPACE

Definition: A room used by faculty, departmental administrative staff, or students working at a desk (or table) or a room which serves an office (or group of offices) as an extension of the activities in an office.

Description: Included in this category are rooms generally referred to as faculty offices, departmental administrative offices, graduate assistant offices, teaching assistant offices, student offices, etc. Also included in this category is a Studio (music, art, etc.) if such a room serves as an office for a staff member. (A Studio intended to serve a group of students is classified as Class Laboratory (undergraduate)). An Office typically is equipped with one or more desks, chairs, tables, bookcases, and/or filing cabinets.

Included in this category are departmental reading rooms, file rooms, departmental or faculty conference facilities, faculty lounges, mimeograph rooms, vaults, waiting rooms, interview rooms, closets, private toilets, records rooms, and office supply rooms.

Limitations: This category does NOT include rooms which are equipped both as office and "research laboratory". A room equipped with laboratory benches, specialized scientific equipment, and/or such utilities as gas, water, steam, air, etc., is classified as a laboratory. Note that this distinction rests on equipment rather than function. It is recommended that those rooms which have office type equipment and fixed laboratory type equipment (primarily in the biological and physical sciences) within the same room be classified within a laboratory category. Large rooms, such as glass shops, printing shops, reading rooms, research laboratories, etc., which have a desk space for a technician or staff member are classified according to the primary purpose of the room rather than Office.

This category does NOT include centralized mimeograph and printing shops.

TLH CLASSIFICATIONS: The following are the TLH classifications and codes which correspond to this category:

faculty office	31000(except 31100, 31400)
student office	32000(except 32500)
supporting technical (1)	33000(except 33200)
supporting clerical (1)	34000
service (2)	37000
conference (2)	38000
lounge (3)	75000

(1) departmental staff only
(2) serving departmental space
(3) faculty lounges only

5. LIBRARY

(a) STACK SPACE

Definition: A room (or portion of a room) used to provide shelving for books and other library material used by staff and/or students on an individual basis.

Description: Included in this category are rooms generally referred to as library stacks.

Limitations: This category does NOT include book-shelf space in Classrooms, Laboratories, or Offices. Audio-visual film and tape libraries which generally serve groups (rather than individuals) are classified as AV-Radio-TV Facilities. Separate tape storage rooms for language laboratories should be classified as Laboratory Service. Separate rooms containing musical scores, records and tapes are classified as Stack if the primary purpose of the materials is for instruction or research (as in a Library or Music Building). Rooms containing such materials and intended for listening enjoyment (as in a Student Union) should be classified as Student Activity space.

(b) STUDY SPACE

Definition: A room used to study books or audio-visual materials on an individual basis or a room which is a combination of Study Room and Stack, generally without physical boundaries between the stack areas and the study areas.

Description: Included in this category are rooms generally referred to as library reading rooms, carrels, study rooms, individual study stations, study booths, and similar rooms which are intended for general study purposes. Study stations may be grouped (as in a library reading room) or individualized (as in a carrel).

Included in this category are rooms generally referred to as open-stack reading rooms.

Limitations: This category does NOT include Individual Study Laboratories. An Individual Study Laboratory is limited in use to a particular area of study, while a Study Room is intended for general study (or a broad area of study). This category does NOT include Classrooms, Laboratories (undergraduate), Laboratories (graduate and faculty), Research Laboratories, Offices, combined sleeping-study rooms in residence halls or other housing units, waiting rooms or lounges outside the control desk.

(c) LIBRARY SERVICE SPACE

Definition: A room which serves a Reading Room, Stack, or Open-Stack Reading Room as a supporting service to such rooms. A room which directly serves a Library Processing Room as a direct extension of the activities in such a room.

Description: Included in this category are rooms generally referred to as card catalog, circulation desk, bookbinding, microfilm processing, and audio-visual record-playback equipment for distribution to individual study stations. Also included are such areas as closets, locker space, coatrooms, etc.

Offices for library staff, acquisitions work areas, are also to be included in this category. Staff lounges are included if they are inside the control desk.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

library study facilities	40000

6. ATHLETICS and RECREATIONAL ATHLETIC SPACE

Definition: A room (or other indoor area) used by students, staff, or the public for athletic activities. The seating area used by students, staff or the public to watch athletic events. Any room which directly serves an athletic or physical education facility as an extension of the activities in such a facility.

Description: Included in this category are rooms generally referred to as gymnasiums, basketball courts, handball courts, squash courts, wrestling rooms, swimming pools, ice rinks. (indoor), indoor tracks, indoor "fields", fieldhouses, and broadcasting and press box facilities.

Included in this category are rooms generally referred to as locker rooms, shower rooms, coaches rooms, ticket booths, dressing rooms, equipment supply rooms, first aid rooms, skate sharpening rooms, towel rooms, etc.

Included in this category are permanent seating areas in fieldhouses, gymnasiums, and natatoria.

Limitations: No distinction is made on the basis of instructional versus intramural or intercollegiate use of gymnasiums, swimming pools, etc. (Institutions which wish to study the utilization of such facilities will need to further subdivide this category.) This category does NOT include Classrooms or Laboratories, even though they may be located in an Athletic building. It does NOT include outside facilities such as tennis courts, archery ranges, etc.

Offices and office related space which serve directly the athletic facilities are not included here but instead classified in category 10 office space.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

athletic-physical education facilities	50000

7. FOOD SERVICE

Definition: A room used for eating food or which directly serves a Food Facility as an extension of the activities in such a facility.

Description: This category includes dining halls (including those in residences), cafeterias, snack bars, restaurants, and similar eating areas.

This category includes such areas as kitchens, refrigeration rooms, freezers, dishwashing rooms, cafeteria serving areas, and other non-dining areas.

Limitations: This category does NOT include office space and office related space which directly serves food service facilities.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

food facilities	73000
food service space (residences)	91000

8. BOOKSTORE, etcetera

Definition: A room (or group of rooms) used to sell products or services or a room which directly services a merchandising facility as an extension of the activities in that room.

Description: This category includes such rooms as bookstores, barber shops, post offices, dairy stores, laundry rooms, and other merchandising areas.

Included in the category are rooms generally referred to as supply closets, linen rooms, valet service etc. serving this class of facilities.

Limitations: This category does NOT include dining rooms, restaurants, snack bars, and similar Food Facilities. It does NOT include meeting rooms which are classified as Conference Rooms. Mail sorting rooms for university mail are also excluded. Office and office related space serving this category in excluded. Space not included in the Allocation Inventory is also to be excluded from this category.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

merchandising facilities	76000

9. MAINTENANCE and UTILITY PLANT

Definition: Space used for the operation and maintenance of the physical plant. This would include a room used for the manufacture or maintenance of products and equipment. A room which directly serves a shop as an extension of the activities in such a room. A room used to store materials. A room which directly serves a storage facility. A room (or structure) used to store or service vehicles.

Description: This category includes such rooms as carpenter shops, plumbing shops, electrical shops, painting shops, and similar trade shops. It also includes central heating and refrigeration, maintenance greenhouses.

Included in this category are tool supply-storage rooms, materials storage rooms, and similar equipment or material supply and/or storage rooms. Locker rooms, shower rooms, lunch rooms, and similar non-public areas should be included.

Classification of a room as a Storage Facility is limited by definition to a central storage facility (warehouse). Storage related to other types of space follow the classification of that type of space with a "service" designation. For example, a storage closet for office supplies is classified as Office Service. The distinction between a "service" classification and "storage" rests on the possibility of physical separation of the materials stored. If the material being stored could be placed in a warehouse, implying only occasional demand for the materials, then Storage Facility is the appropriate classification. Storage which must, by the nature of the materials stored and the demands placed upon them by the program, be close at hand should be classified according to the appropriate "Service" category.

This category includes rooms (or structures) generally referred to as garages, boat houses, airport hangars, and other storage areas for vehicles (broadly defined).

This category includes any area associated with a Vehicle Storage facility which is used for the maintenance and repair of automotive equipment, boats, airplanes, and similar vehicles.

Limitations: This category does NOT include instructional shops; industrial arts and vocational-technical shops used for instruction should be classified as Laboratories. Highly specialized shops for the production of scientific apparatus and equipment should be classified as Laboratory Service. Materials preparation areas in Audio-Visual, Radio Stations, and TV Studios should be classified as Academic Service space.

This category does NOT include portions of barns or similar field-Service Facilities which are used to house farm implements, or parking areas. Offices and office related space serving this category are excluded. Locker rooms, shower rooms, and lunch rooms for custodial staff are non-assignable and therefore are excluded from this category.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

non assignable [1]	00000
physical plant maintenance and operations	84000 (except 84200)

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(1) central mechanical only

10. OFFICE SPACE (not elsewhere classified) and RELATED SPACE

Definition: A room used by administrative staff (not elsewhere classified) working at a desk (or table) or a room which serves an office (or groups of offices) as an extension of the activities in an office.

Description: Included in this category is all office space not excluded by the limitations.

Included are file rooms, mimeograph rooms, vaults, waiting rooms, interview rooms, closets, private toilets records rooms, office supply rooms, and conference facilities.

Limitations: This category does NOT include centralized mimeograph and printing shops. Academic offices, departmental support staff offices, library offices, student offices and related office space are not included in this category.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

professional, other offices	31400
executive office facilities	31100
audio visual offices	33200
support clerical(1)	34000
service	37000
conference	38000
lounge(2)	75000

(1) except departmental
(2) which serves offices - this category.

11. ACADEMIC SERVICES

Definition: A room or group of rooms used in the production and distribution of instructional media or a room which directly serves an A.V. radio or T.V. facility as an extension of the activities in such facilities.

Description: This category includes rooms generally referred to as TV studios, radio studios, sound studios, graphics studios, and similar rooms.

Limitations: Studios used primarily as part of an instructional program to train students in communication techniques should be classified as Laboratories. Offices and office related space serving this category are not classified in this category. Areas for printing instructional media are to be classified in category 12 (Central Services).

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

audio visual	63000

12. CENTRAL SERVICES

Definition: A central facility serving the general need of the university. A room (or group of rooms) for university wide processing of data by machines or computers. A room which directly serves a data processing-computer facility as an extension of the activities of that facility.

Description: This category includes laundry rooms, drying rooms, ironing rooms, etc., located in a Central Laundry. It also includes central printing and duplicating shops, central receiving and central stores.

This category includes keypunch rooms, electronic data processing rooms, electronic computer rooms, and similar data processing areas.

This category includes such rooms as card storage, paper form storage, tape storage, tape storage vaults, control rooms, plugboard storage, wiring rooms, equipment repair rooms, observation rooms, and similar service areas.

Limitations: Laundry rooms, drying rooms, ironing rooms, etc., NOT located in a Central Laundry are classified as Residential Facilities or as a Service facility to whatever type of space they serve.

This category does NOT include rooms containing desk calculators, posting-billing machines, check-writing machines, and similar Office Service rooms. It is recommended that the area occupied by a keypunch machine sorter, or other EDP equipment in a room otherwise classifiable as an Office NOT be assigned to this category. A data processing facility used only for instruction should be classified as a Laboratory. Such a facility used for instruction and/or research and/or administrative data processing should be included in this category. Office and office related space is excluded from this category.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

data processing	81000
central stores	84200
shop facilities	82000

13. SERVICES TO STUDENTS

Definition: Facilities provided by the institution to serve the general student population.

Description: Included in this category are such rooms as dispensaries, record rooms, waiting rooms, scrub-up rooms, linen closets, examination rooms, bedrooms, and surgery rooms.

Limitations: Office and office related space is excluded from this category.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

clinic facilities	65000

14. COMMON USE SPACE and STUDENT ACTIVITY SPACE

Definition: A room used for recreational purposes. A room used for rest and relaxation. A room which directly serves as an extension of the activities of these facilities.

Description: This category includes such rooms as bowling alleys, pool and billiards rooms, ping pong rooms, ballrooms, chess rooms, card-playing rooms, (non-instructional) music listening rooms, and hobby rooms. Also included are student clubs, student government offices, common rooms, general lounge areas, and general use lockers not directly serving specific rooms.

This category includes storage closets, equipment issue rooms, cashiers desk, and similar areas.

The faculty club lounges and games areas are also to be included in this category.

Limitations: This category does NOT include gymnasiums, basketball courts, handball courts, squash courts, wrestling rooms, swimming pools, ice rinks, indoor tracks, indoor fields, or field houses, which should be classified as Athletic-Physical Education Facilities. It does NOT include outside facilities such as tennis courts, archery ranges, fields (football, hockey, etc.) or golf courses. Departmental lounges are excluded from this category.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

lounge facilities(1)	75000
recreation	77000
Student enterprises	32500

(1) serving offices in this category

NOTE: lounges in residences which serve the general student population are included in this category.

15. ASSEMBLY and EXHIBITION FACILITIES

Definition: A room designed and equipped for dramatic, musical or devotional activities. Rooms used for exhibits. Associated service areas.

Description: This category includes rooms generally referred to as theaters, auditoriums, concert halls, chapels, and convocation halls. Seating area, stage, orchestra pit and chancel are also included.

This category includes museums, art galleries, and similar exhibition areas.

This category includes check rooms, coat rooms, ticket booths, dressing rooms, projection booths, property storage, make-up rooms, costume storage, green rooms, control rooms, which serve space in this category.

Limitations: Study collections NOT primarily for general exhibition such as departmental displays of anthropological, botanical, or geological specimens should be classified under an appropriate Laboratory Facility category.

TLH CLASSIFICATION: The following are the TLH classifications and codes which correspond to this category;

assembly facilities	71000
exhibition facilities	72000
chapel	14000

16. NON-ASSIGNABLE AREAS

Non-assignable circulation and service areas whose use classification names and codes as indicated in the latest available OUPRS[(1)] reports are among the following:

Custodial areas, circulation areas enclosed inaccessible service space public toilets, etc.	01100 - 01200 01340 - 01630

Non-assignable mechanical areas, other than primary or central utilities plants or facilities which are the main source of utilities services to one or more of the various segments of the campus, whose use classification names and codes as indicated in the latest available OUPRS(1) reports are among the following:

Communications service and equipment, refuse areas, heating, ventilation and power	01310 - 01334

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(1) OUPRS - Ontario Universities Physical Resources Survey

17. AREAS NOT COVERED BY RECOMMENDATIONS OF THE TASK FORCE

Non-assignable animal areas and field service facilities, that are related to farm operations, whose use classification names and codes as indicated in the latest available OUPRS(1) reports are among the following:

Animal Housing: cages, barns	27610
Animal Feed: bedding, holding	27620
Animal Facilities: cage cleaning	27690
Field service facilities (barns, animal shelters, sheds, silos, field units, hay storage, seed houses, greenhouses)	69000

Non-assignable residential areas whose use classification names and codes as indicated in the latest available OUPRS(1) reports are among the following:

Residential living quarters	92100 - 92390
Housing: managers, supervisors etc.	35100
Matron: housemother	35200

Non-assignable circulation and service areas whose use classification names and codes as indicated in the latest available OUPRS(1) reports are among the following:

Armory facilities: indoor drill area, rifle range, military science rooms, services, supply, weapons, storage	61100-61770

All areas directly associated with health science programmes.

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(1) OUPRS - Ontario Universities Physical Resources Survey

APPENDIX D

FIRST LEVEL

EDUCATION

FINE AND APPLIED ARTS

HUMANITIES AND RELATED

SOCIAL SCIENCES AND RELATED

AGRICULTURAL AND BIOLOGICAL SCIENCE
(excluding Health Professions)

ENGINEERING AND APPLIED SCIENCES

HEALTH PROFESSIONS AND OCCUPATIONS

MATHEMATICS AND THE PHYSICAL SCIENCES

SECOND LEVEL

EDUCATION

FINE AND APPLIED ARTS

Theory (history, appreciation of art, music, sculpture, etc.)
Ceramics
Drama, Theatre
Engraving
Industrial Design
Interior Design
Lithography
Music
Painting, Art
Printing
Sculpture

HUMANITIES AND RELATED

Classics, Classical and Dead Languages
Creative Writing
History
Library and Records Science
Mass Media Studies
Modern and Mediaeval Languages and Literature
Philosophy
Religious Studies
Translation and Interpretation

SOCIAL SCIENCES AND RELATED

Anthropology
Archaeology
Area Studies
Commerce, Business Administration
Economics
Geography
Law
Linguistics
Man/Environment Studies
Political Science
Psychology
Social Work
Sociology
Military Studies

AGRICULTURAL AND BIOLOGICAL SCIENCF (excluding Health Professions)

Agriculture
Biochemistry
Biology
Biophysics
Botany
Household Science and Related
Veterinary Medicine and Sciences
Zoology

ENGINEERING AND APPLIED SCIENCES

Architecture
Engineering
Engineering Science
Forestry
Landscape Architecture

HEALTH PROFESSIONS AND OCCUPATIONS

Dentistry
Medicine
Nursing
Optometry
Pharmacy
Public Health
Rehabilitation Medicine
Art as Applied to Medicine
Dental Hygiene
Medical Technology

MATHEMATICS AND THE PHYSICAL SCIENCES

Actuarial Science
Applied Mathematics
Mathematical Statistics
Mathematics
Chemistry
Geology and Related
Metallurgy, material science
Meteorology
Oceanography
Physics

THIRD LEVEL

EDUCATION

- adult, continuing, extension education
- art and fine arts education
- commercial education
- curriculum specialization
- elementary education
  - reading
  - writing
  - arithmetic
- exceptional groups of children
  - deaf and dumb
  - emotionally maladjusted
  - highly gifted
  - Indian children
  - mentally retarded
  - physically, handicapped (n.e.s.)
- home economics education
- hygiene, teaching of
- industrial arts
- music education
  - piano
  - singing
- nursery and kindergarten education

EDUCATION (cont'd)

- physical and health education and recreation
  - physical education
  - kinesiology
  - kinanthropology
  - recreology
- secondary education
  - English
  - French
  - History
  - Geography
  - Mathematics
  - not classified
- vocational education
- comparative education
- counselling and guidance
- educational administration and organization
- educational media and school librarianship
- educational planning
- educational statistics
- history, philosophy and theory of education

FINE AND APPLIED ARTS

- Theory (history, appreciation of art, music, sculpture, etc.)
- Ceramics
- Drama, Theatre
- Engraving
- Industrial Design
- Interior Design
- Lithography
- Music
  - church music, sacred music
  - composition
  - conducting
  - organ
  - piano
  - violin
  - singing, opera singing
- Painting
- Printing
- Sculpture

HUMANITIES AND RELATED

- Classics, Classical and Dead Languages
  - Classics
  - Greek
  - Hebrew
  - Latin

HUMANITIES AND RELATED (cont'd)

- Creative Writing
- History
  - specific area or period history
  - ancient, mediaeval, modern history
- Library and Records Science
  - library science
  - medical records science
  - archive maintenance
- Mass Media Studies
  - film
  - radio
  - television
  - journalism
- Modern and Mediaeval Languages and Literature
  - English
  - French
  - German
  - Icelandic
  - Italian
  - Portuguese
  - Spanish
  - Scandinavian (n.e.s.) Danish, Norwegian, Swedish
  - Other West European (specify)
  - Polish
  - Russian
  - Ukrainian
  - Other Slavic, East European
  - Arabic
  - Hebrew (modern only)
  - Chinese
  - Japanese
  - Other Asian languages and literature (specify)
  - African languages and literature (specify)
  - Comparative literature
  - Combination of above (specify)
- Philosophy
  - ancient, mediaeval, modern philosophy
  - epistemology
  - ethics
  - history of philosophy
  - logic
  - philosophy of science
- Religious Studies (do not include religious education)
  - Canon Law
  - Religious Studies (n.e.s.)
  - Theology, Divinity
- Translation and Interpretation

SOCIAL SCIENCES AND RELATED

Anthropology
  anthropoligical linguistics
  anthropometry
  cultural, social anthropology
  ethnography
  ethnology
Archaeology
  archaeological field techniques
  archaeology, general
  archaeological prehistory
  laboratory techniques in archaeology
  stratigraphy of archaeological sites
Area Studies: multidisciplinary approach to the study of a particular region or period. Do not include programmes primarily concerned with the languages and/or literature of an area
  African Studies
  Canadian Studies
  East Asian Studies
  Islamic Studies
Commerce, Business Administration
  Business Administration
  Commerce
    accounting
    finance
    industrial relations
    management techniques
    marketing, retailing
    personnel management
Hotel and Food Administration
Hospital Administration
Nursing Administration
Secretarial Science
Economics
  econometrics
  economics, general
  economic history
  international economics
  macroeconomics
  microeconomics
  monetary and fiscal policy and theories
  national accounts
  price theory
  resource allocation
  theories of economic welfare

SOCIAL SCIENCES AND RELATED (cont'd)

Geography (Do not include earth sciences, elswhere specified)
  geography (general)
  economic geography
  historical geography
  human geography
  land use geography
  natural resources geography
  physical geography
  political geography
  regional (indicate region) geography
  rural geography
  urban geography
Law
  administrative law
  air and space law
  civil law
  commercial and company law
  comparative law
  constitutional law
  criminal law
  family law
  international law
  jurisprudence
  labour law
  maritime law
  municipal law
  private law
  public law
Linguistics
Man/Environment Studies (Do not include architecture, landscape architecture, or pre-professional programmes in architecture)
  community development
  human ecology
  man/environment studies (Interaction of man and his environment)
  regional planning
  resource management
  rural planning
  urban planning
Political Science
  comparative politics
  government (exclude public administration)
  international relations
  political history
  political thought
  political science (general)
  public administration
  municipal administration
  urban politics

SOCIAL SCIENCES AND RELATED (cont'd)

- Psychology (Educational psychology with education)
  - abnormal, pathological psychology
  - behavioural psychology
  - child and adolescent psychology, child study
  - clinical psychology
  - cognitive development
  - comparative psychology
  - experimental psychology
  - history of psychology
  - learning theory
  - physiological psychology
  - psychology, general
  - psychometrics, psychology statistics
  - social psychology
- Social Work
  - social welfare
  - social work
- Sociology
  - criminology (include penology and related)
  - demography
  - folklore
  - sociology of education
  - sociology of the family
  - sociology of industry and work
  - sociology of the professions
  - sociology of religion
  - social theory and social structure
- War Studies
  - military studies
  - naval, airforce, army studies
  - strategy
  - tactics, etc.
  - war, military history

AGRICULTURE AND BIOLOGICAL SCIENCES (excluding health professions)

- Agriculture (do not include agric. eng., landscape arch., env. horticulture, ornamental hort.)
  - agriculture, general
  - agricultural entomology
  - agricultural genetics
  - agricultural parasitology
  - animal science, animal husbandry
  - apiculture
  - crop science, agronomy

AGRICULTURE AND BIOLOGICAL SCIENCES (cont'd)

- Agriculture (cont'd)
  - dairy science
  - food science
  - horticulture
  - plant science, incl. plant protection
  - poultry science
  - soil science
  - weed science
- Biochemistry (do not include students of medicine)
  - Function and metabolic reactions of
    - carbohydrates
    - enzymology
    - hormones and steriods
    - lipids
    - nucleic acids
    - proteins
- Biology
  - biology, general
  - developmental biology
  - evolutionary biology
  - functional biology
  - genetic biology
  - microbiology
  - molecular biology
  - pathological biology
  - systematic biology
- Biophysics (exclude medical biophysics)
  - bioelectrical phenomena
  - biophysical analysis
  - biothermodynamics
  - cellular biophysics
  - environmental biophysics
  - molecular biophysics
- Botany (paleobotany and palynology included in geology and related)
  - botany, general
  - bryology
  - mycology
  - phycology
  - plant breeding
  - plant ecology
  - plant environment
  - plant evolution
  - plant genetics
  - plant morphology
  - plant pathology, plant virology, and related
  - plant physiology
  - plant taxonomy

AGRICULTURE AND BIOLOGICAL SCIENCES (cont'd)

- Household Science and Related (do not include interior design)
  - clothing and textiles
  - consumer studies
  - family studies
  - food and nutrition, dietetics
  - home economics
  - household science, general
- Veterinary Medicine and Veterinary Sciences
  - veterinary anatomy
  - veterinary bacteriology
  - veterinary biochemistry
  - veterinary embryology
  - veterinary genetics
  - veterinary histology
  - veterinary immunology
  - veterinary medicine
  - veterinary microbiology
  - veterinary myeology
  - veterinary obstetrics
  - veterinary parasitology
  - veterinary pathology
  - veterinary pharmacology
  - veterinary serology
  - veterinary surgery
  - veterinary virology
- Zoology (paleontology is included with geology and related)
  - animal anatomy
  - animal ecology
  - animal genetics
  - animal histology
  - entomology
  - ethology
  - fisheries biology
  - fisheries and wildlife management
  - ichthyology
  - invertebrate zoology
  - mammalogy
  - marine biology
  - ornithology
  - protozoology
  - vetebrate zoology
  - zoology, general

ENGINEERING AND APPLIED SCIENCES

- Architecture (exclude regional planning, urban planning and related)
- Engineering
  - aeronautical engineering
  - aerospace engineering
  - agricultural engineering
  - biomedical engineering

ENGINEERING AND APPLIED SCIENCES(cont'd)

- Engineering (cont'd)
  - chemical engineering
  - civil engineering
  - design systems engineering
  - electrical engineering
  - environmental engineering
  - forestry engineering
  - geological engineering
  - industrial engineering
  - mechanical engineering
  - metallurgical engineering, materials science
  - mining engineering
  - petroleum engineering
  - surveying engineering, geodesy, photogrammetry
- Engineering Science
  - engineering physics
  - engineering science (n.e.s.)
- Forestry
  - dendrology
  - forest ecology
  - forest entomology and pathology
  - forest harvesting
  - forestry general
  - forestry management
  - forestry protection
  - forest wildlife management
  - silviculture
  - wood science and technology
- Landscape Architecture
  - garden design
  - landscape design and construction
  - landscape materials
  - landscape planning

HEALTH PROFESSIONS AND OCCUPATIONS

- Dentistry
  - dentistry, general
  - dental materials and prosthetics, restorative dentistry
  - endodontics
  - operative dentistry
  - oral anatomy
  - oral biology
  - oral histology and embryology
  - oral microbiology and immunology
  - oral pathology and diagnosis
  - oral physiology and occlusion
  - oral surgery
  - orthodontics
  - paedodontics
  - periodontics
  - prosthedontics

HEALTH PROFESSIONS AND OCCUPATIONS (cont'd)

- Medicine
  - Basic Sciences
    - medical anatomy
    - medical biochemistry
    - medical biophysics
    - medical embryology
    - medical endocrinology
    - medical genetics
    - medical histology
    - medical metabolism
    - medical neuroanatomy
    - medical neurophysiology
    - medical neurochemistry
    - medical pharmacology
    - medical physiology
- Medical Specializations
  - allergology
  - anaesthesiology
  - cancer
  - cardiology
  - dermatology
  - gastroenterology
  - Haematology
  - infectious diseases
  - internal medicine
  - investigative and experimental medicine
  - medicine, general
  - nephrology
  - neurology
  - paediatrics
  - psychiatry
  - radiology (nuclear medicine, radiotherapy, diagnostic radiology)
  - respirology
  - rheumatology
  - tropical medicine
- Paraclinical Sciences
  - medical bacteriology
  - medical immunochemistry
  - medical immunology
  - medical immunopathology
  - medical microbiology
  - medical neuropathology
  - medical pathology, pathological chemistry
  - medical parasitology
  - medical virology
- Surgery and Specializations in Surgery
  - brain surgery
  - cardiovascular surgery
  - neurosurgery
  - obstetrics and gynaecology
  - ophthalmology
  - orthopaedic surgery
  - otolaryngology
  - plastic surgery
  - surgery, general
  - thoracic surgery
  - urology
- Nursing
  - disabled persons
  - geriatric nursing
  - medical-surgical, hospital nursing
  - nursing, general
  - obstetric nursing
  - paediatric nursing
  - psychiatric nursing and mental health care
  - public health and community nursing
- Optometry
- Pharmacy (include pharmacology with medicine)
  - clinical pharmacy
  - medicinal pharmacy
  - pharmaceutics
  - pharmaceutical chemistry
  - pharmaceutical therapeutics
  - pharmacognosy
  - physical pharmacy
  - radiopharmacy, bionucleonics, pharmaceutical applications of nuclear medicine
- Public Health (science of promotion, protection and restoration of health by organized community action)
  - community medicine and hygiene
  - community nutrition, public health nutrition
  - dental public health
  - environmental health and hygiene
  - epidemiology
  - industrial medicine and hygiene
  - medical public health
  - preventive medicine
  - veterinary publich health
- Rehabilitation Medicine
  - audiology and speech pathology

HEALTH PROFESSIONS AND OCCUPATIONS (cont'd)

- Rehabilitation Medicine (cont'd)
  - occupational therapy
  - physical therapy
- Art as Applied to Medicine
- Dental Hygiene
- Medical Technology
  - medical laboratory technology and science
  - radiologic technology

MATHEMATICS AND THE PHYSICAL SCIENCES

- Actuarial Science
  - life contingency mathematics
  - math. of insurance
  - math. of investment
- Applied Mathematics
  - computer science
  - operations research
- Chemistry (do not include geochemistry, biochemistry)
  - analytical chemistry
  - chemical reactions, reaction kinetics
  - electrochemistry
  - inorganic chemistry
  - organic chemistry
  - physical chemistry
  - stereochemistry
- Geology and Related
  - crystallography
  - general geology
  - geochemistry
  - geomorphology
  - geophysics
  - hydrology
  - paleontology
  - paleobotany
  - palynology
  - petrography and petrology
  - stratigraphy and sedimentation
  - tectonics
- Mathematical Statistics (include subject statistics with the field in question, e.g. economic statistics with economics, psychology statistics with psychology, etc.)
  - central tendency
  - Markov-chains
  - multivariate analysis
  - non-parametric methods
  - parametric methods
  - probability theory and mathematics

MATHEMATICS AND THE PHYSICAL SCIENCES (cont'd)

- Mathematical Statistics (cont'd)
  - sampling and survey techniques and methods
  - statistical inference
  - stochastic processes
  - theory of distributions
- Mathematics
  - algebra
  - analysis and functional analysis
  - combinatorial mathematics
  - game theory
  - geometry
  - mathematical logic
  - number theory
  - numerical analysis
  - optimization techniques
  - set theory
  - topology
- Metallurgy, Material Science
  - chemical metallurgy
  - physical metallurgy
  - structure and property of materials
- Meteorology (do not include subject given under geography)
  - agrometeorology
  - climatology
  - meteorology general
  - weather analysis, forecasting
- Oceanography (interdisciplinary approach to study of the ocean)
  - biological oceanography
  - chemical oceanography
  - ocean geology and geophysics
  - physical oceanography
- Physics (do not include geophysics, biophysics)
  - astrophysics and astronomy
  - atomic physics
  - chemical physics
  - electricity and magnetism
  - mathematical physics
  - mechanics
  - nuclear physics
  - optics
  - physical acoustics
  - physics of fluids
  - quantum physics, quantum mechanics
  - solid state physics
  - theoretical physics
  - thermal physics
  - thermodynamics and statistical mechanics
  - wave theory

APPENDIX E

INTERIM CAPITAL FORMULA

The following table is a brief summary of the interim capital formula. As shown the various programmes offered by the universities are grouped in five categories with associated weights ranging from 1.0 to 1.5 per full-time student. Each weighted unit carries a space entitlement of 96 square feet or a dollar entitlement of $5250 (that is 96 square feet at $55 per square foot). For each university the total space generated is compared with the current inventory to identify a space entitlement which is then expressed in dollars.

Categories	Weighting	Total net area per student[i]	Total ordinary, capital funding per student place
Undergraduate arts, general science, etc.	1	96 sq.ft.	$ 5,280
Honours science, undergraduate professional courses. Master's course in non-laboratory subjects	1.5	144	7,920
Master's level in laboratory subjects	3	288	15,840
PhD in non-laboratory subjects	2	192	10,560
PhD in laboratory subjects	4	384	21,120

The following table is used for calculating total weighted enrolment and shows the weight assigned to each programme. 'NA' refers to programmes not presently applicable for capital formula support.

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[i] Assignable area is the net plan area, excluding corridors and circulation space, mechanical service area, walls, janitors' closets and so forth.

INSTITUTION ____________________
TOTAL WEIGHTED ENROLMENT ____________________

CALCULATION OF WEIGHTED ENROLMENT FOR PURPOSES OF THE INTERIM CAPITAL FORMULA - 197 - 197 .

Form DUA-71-R

PROGRAM	UNDERGRADUATE					
	DIP& Other Non-Degree			DEGREE		
	ENROLMENT	CATEGORY WEIGHT	WEIGHTED ENROLMENT	ENROLMENT	CATEGORY WEIGHT	WEIGHTED ENROLMENT
Agriculture		1.5			1.5	
Architecture		1.5			1.5	
Arts,Gen. & 1st Yr. Hon.		1.0			1.0	
Arts, Upper Yrs. Hon.		1.0			1.0	
Commerce - Bus. Admin.		1.0			1.0	
Dentistry		N/A			N/A	
Engineering		1.5			1.5	
Fine & Applied Arts		1.0			1.0	
Forestry		1.5			1.5	
Household & Food Science		1.5			1.5	
Hygiene & Public Health		N/A			N/A	
Journalism		1.0			1.0	
Law		1.0			1.0	
Library Science		1.0			1.0	
Medicine		N/A			N/A	
Pre-Medicine		1.0			1.0	
Music		1.5			1.5	
Nursing		N/A			N/A	
Pharmacy		1.5			1.5	
Physical & Health Ed.		1.5			1.5	
Physio & Occ. Therapy		N/A			N/A	
Secretarial Science		1.0			1.0	
Science,Gen. & 1st Yr.Hon.		1.0			1.0	
Science, Upper Yrs. Hon.		1.5			1.5	
Social Work		1.0			1.0	
Veterinary Medicine		N/A			N/A	
Education		N/A			N/A	
Theology						
Dental Hygiene		N/A				
Dip.Pub. Health Nursing		N/A				
Technology Courses		1.5				
Preliminary Year		1.0				
Med. Interns & Residents		N/A				
TOTALS						

PROGRAM	GRADUATE								
	DIPLOMA & M. PHIL.			MASTERS & 1st STAGE DOC.			2nd STAGE DOC		
	ENROLMENT	CATEGORY WEIGHT	WEIGHTED ENROLMENT	ENROLMENT	CATEGORY WEIGHT	WEIGHTED ENROLMENT	ENROLMENT	CATEGORY WEIGHT	WEIGHTED ENROLMENT
Agriculture		3.0			3.0			4.0	
Architecture		3.0			3.0			4.0	
Child Study		3.0			3.0			-	
Commerce - Bus. Admin.		1.5			1.5			-	
Dentistry		N/A			N/A			N/A	
Engineering		3.0			3.0			4.0	
Fine & Applied Arts		1.5			1.5			2.0	
Forestry		3.0			3.0			4.0	
Geography		3.0			3.0			4.0	
Hospital Admin.		N/A			N/A			-	
Household & Food Science		3.0			3.0			4.0	
Humanities		1.5			1.5			2.0	
Hygiene & Public Health		N/A			N/A			N/A	
Journalism		1.5			1.5			-	
Law		1.5			1.5			2.0	
Library Science		1.5			1.5			-	
Mathematics		1.5			1.5			2.0	
Medicine		N/A			N/A			N/A	
Music		3.0			3.0			2.0	
Nursing		N/A			N/A			-	
Pharmacy		N/A			N/A			N/A	
Physical & Health Ed.		1.5			1.5			-	
Physical & Bio. Sc.		3.0			3.0			4.0	
Physio & Occ. Therapy		N/A			N/A			-	
Psychology		3.0			3.0			4.0	
Public Administration		1.5			1.5			-	
Social Work		1.5			1.5			-	
Social Sciences - Other		1.5			1.5			2.0	
Veterinary Medicine		N/A			N/A			N/A	
Education		N/A			N/A			N/A	
Theology									
TOTALS									

APPENDIX F

UNIVERSITY ______________________

UNIVERSITY DATA(1) - SPACE AND UTILIZATION

SPACE CLASSIFICATION	TLH CATEGORY	NET ASSIGNABLE SQUARE FEET	STATIONS
Classroom	11000, 12000		
	13000		
	17000, 18000, 19000		-
Library	41000, 42000, 75000(2)		
	43000		-
	30000, 44000, 45000, 46000, 75000		-
Athletics and Recreational Athletic Space	50000, 61000(3)		-
Food Service	73000		
	91000		
Bookstore, etcetera	76000(4)		-
Maintenance and Utility Plant	84000(5)		-
	01300(6)		

Scheduled weekly hours of operation (classroom facilities)- ______

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1. except where noted all data is to be reported as of December 1, 1970.
2. student lounges within control area of the library
3. indoor rifle ranges only
4. note how much of the space is Bookstore proper
5. except 84200
6. central mechanical only

UNIVERSITY____________________

UNIVERSITY DATA(1) - SPACE AND UTILIZATION

SPACE CLASSIFICATION	TLH CATEGORY	NET ASSIGNABLE SQUARE FEET	STATIONS
Office Space (not elsewhere classified) and Related Space	31100, 31400, 33000(2), 34000(3), 35000		-
	37000(4), 38000(4), 75000(5)		-
Academic Services	63000		-
Central Services	81000		-
	82000, 84200		-
Service to Students	65000		-
Common Use Space and Student Activity Space	32500, 75000(5)		-
	61000		-
	75000(6)		-
	77000		
Assembly and Exhibition Facilities	14000		-
	71000		
	72000		-
Non-formula	-		-

---

1. except where noted all data is to be reported as of December 1, 1970.
2. except those offices for persons in the position series 2000 and 2300-2400 series
3. except those offices for departmental support staff
4. except space servicing departmental office facilities
5. serving office facilities in this category
6. except those lounges serving offices in categories 4, 5, 10 and 14a.

UNIVERSITY ____________________

UNIVERSITY DATA(1) - INPUT MEASURES

1. Weekly student contact hours

- to be reported on the form attached

2. Departmental Data

- to be reported on the form attached

3. Classified FTE Enrolment

- not necessary to report this data. This information will be extracted from the UA-3 enrolment reporting forms.

FTE enrolment (residence) - ____________________

FTE enrolment (non-residence) - ____________________

4. Non-academic (non-teaching) staff

- headcount of all non-academic (non-teaching) staff from all payrolls for the pay period ending November 30, 1970, and excluding departmental support staff and library staff.

NUMBER OF PERSONS(2) - ____________________

5. Library staff

- to be calculated as in section 3 above

LIBRARY STAFF - ____________________

---

1. except where noted all data is to be reported as of December 1, 1970.

2. if possible note number of persons employed temporarily.

...continued

6. Equivalent volumes

- to be calculated as per the California standards reproduced below:

1,000 documents and pamphlets = 125 volumes ____________

400 microfilm reels = 125 volumes ____________

10,000 microfilm cards, prints = 125 volumes ____________

7 newspapers - unbound display = 125 volumes ____________

9 - back files = 125 volumes ____________

15 periodicals - unbound display = 210 volumes ____________

30 - boxed = 125 volumes ____________

500 recording discs = 125 volumes ____________

1 book = 1 volume ____________

7. Total Gross Area

TOTAL GROSS AREA - ____________

UNIVERSITY ______________________

DEPARTMENTAL DATA(1) - SPACE AND UTILIZATION

DEPARTMENT	OFFICE SPACE			
	DEPARTMENTAL SUPPORT STAFF		SERVICE,CONFERENCE, LOUNGE	
	33000(2), 34000(3)		37000(4), 38000(4), 75000(4)	
	SQUARE FEET	STATION	SQUARE FEET	STATION
UNCLASSIFIED				
TOTAL				

1. except where noted all data is to be reported as of December 1, 1970.
2. for persons in the position series 2000 and 2300-2400 series
3. office space for departmental support staff only
4. serving office facilities in this category

UNIVERSITY______________________

DEPARTMENTAL DATA(1) - SPACE AND UTILIZATION

DEPARTMENT	OFFICE SPACE			
	ACADEMIC (TEACHING) STAFF		STUDENT	
	31000(2)		32000(3)	
	SQUARE FEET	STATION	SQUARE FEET	STATION
UNCLASSIFIED				
TOTAL				

---

1. except where noted all data is to be reported as of December 1, 1970.
2. except 31100 and 31400
3. except 32500

UNIVERSITY ____________________

DEPARTMENTAL DATA(1) - SPACE AND UTILIZATION

DEPARTMENT	LABORATORY (UNDERGRADUATE)			
	20430,21000,22700, 67000,69000		23000(2),24000(2) 25000(2),26000(2), 27000(2)	SCHEDULED HOURS OF OPERATION PER WEEK
	SQUARE FEET	STATIONS	SQUARE FEET	
UNCLASSIFIED				
TOTAL				

1. except where noted all data is to be reported as of December 1, 1970.
2. which serves laboratories in this category. If it is not possible to prorate this space between laboratory (undergraduate) and laboratory (graduate and faculty) then include all space in these categories under service space for laboratory (undergraduate).

Scheduled weekly hours of operation (U.G laboratory facilities)________

UNIVERSITY________________________

DEPARTMENTAL DATA(1) - SPACE AND UTILIZATION

DEPARTMENT	LABORATORY (GRADUATE AND FACULTY)	
	20100, 20200, 20410, 20420, 20500, 20900	23000(2), 24000(2) 25000(2), 26000(2) 27000(2)
	SQUARE FEET	SQUARE FEET
UNCLASSIFIED		
TOTAL		

1. except where noted all data is to be reported as of December 1, 1970.
2. which serves laboratories in this category. If it is not possible to prorate this space between laboratory (undergraduate) and laboratory (graduate and faculty) then include all space in these categories under service space for laboratory (undergraduate).

UNIVERSITY ____________________

DEPARTMENTAL DATA(1) - INPUT MEASURES

DEPARTMENT	FULL-TIME GRADUATES		FTE OF PART-TIME GRADUATE (2)
	GRAD.	PDF*	
UNCLASSIFIED			
TOTAL			

1. except where noted all data is to be reported as of December 1, 1970.
2. calculated as per DUA instructions on the UA-3 enrolment reporting forms.

* Post-doctoral fellow

UNIVERSITY ______________________

DEPARTMENTAL DATA(1) - INPUT MEASURES

DEPARTMENT	FULL-TIME ACADEMIC (TEACHING)	FTE OF PART-TIME ACADEMIC (TEACHING) STAFF(2)	DEPARTMENTAL SUPPORT STAFF (3)
UNCLASSIFIED			
TOTAL			

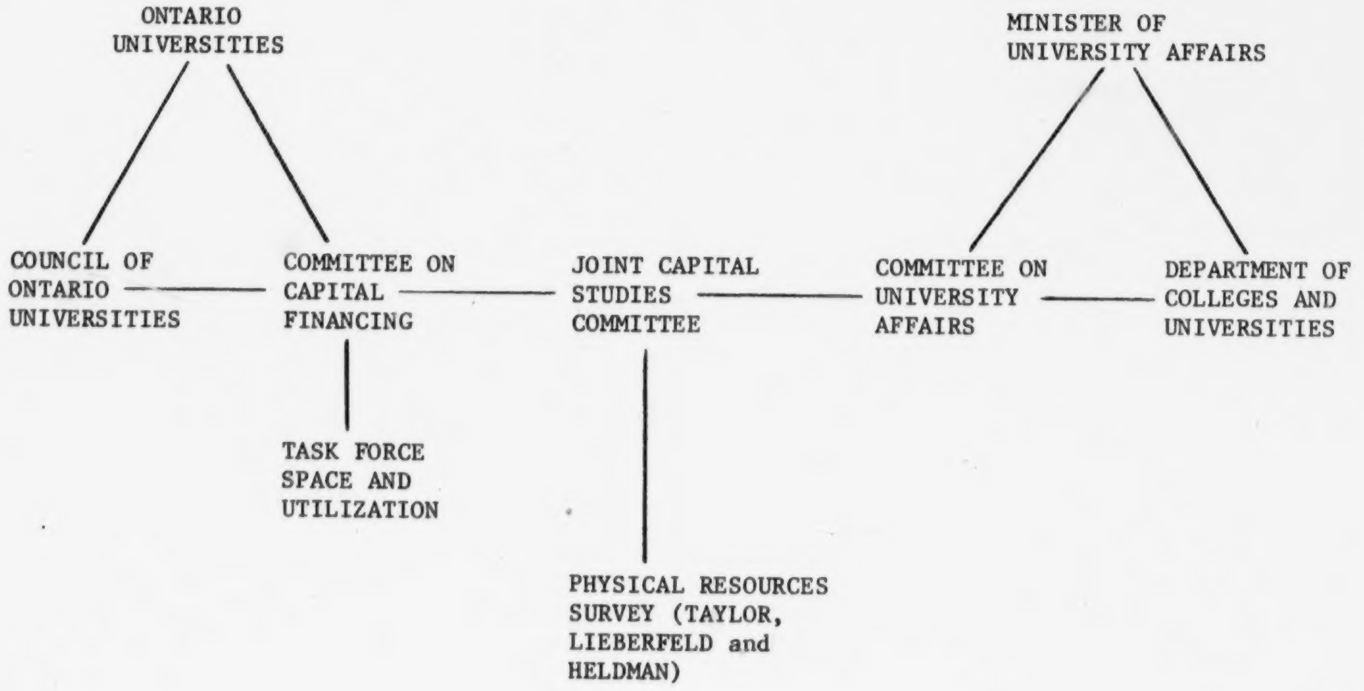
1. except where noted all data is to be reported as of December 1, 1970.
2. calculated as per DUA instructions on the UA-1 forms (includes graduate and others who teach, demonstrators)
3. headcount of all non-academic (teaching) staff from all payrolls for the pay period ending November 30, 1970, and including only departmental support staff (such as technicians, laboratory assistants, markers, animal attendants).

UNIVERSITY______________________

DEPARTMENTAL DATA - INPUT MEASURES

DEPARTMENT	CLASSROOMS, SEMINARS, TUTORIALS, WEEKLY STUDENT CONTACT HOURS	LABORATORY WEEKLY STUDENT CONTACT HOUR	TOTAL BY DEPARTMENT
UNCLASSIFIED			
TOTAL			

APPENDIX G


ONTARIO UNIVERSITIES
MINISTER OF UNIVERSITY AFFAIRS
COUNCIL OF ONTARIO UNIVERSITIES
COMMITTEE ON CAPITAL FINANCING
JOINT CAPITAL STUDIES COMMITTEE
COMMITTEE ON UNIVERSITY AFFAIRS
DEPARTMENT OF COLLEGES AND UNIVERSITIES
TASK FORCE SPACE AND UTILIZATION
PHYSICAL RESOURCES SURVEY (TAYLOR, LIEBERFELD and HELDMAN)

Relationships of the Various Committees

APPENDIX H

DEFINITION OF INPUT MEASURES

1. Enrolment

Enrolment is to correspond with the actual enrolment as of December 1 that is reported to the Department of Colleges and Universities for purposes of the Ontario Operating Grants Formula. The following is a summary of the guidelines established by DCU for this purpose.

a) Total full-time equivalent undergraduate enrolment is equal to the sum of the total full-time diploma and non-degree students and the full-time equivalent of degree students. The full-time equivalent of degree students is obtained from the sum of the full-tine degree students and the full-time equivalent or FTE of part-time degree students. The FTE of part-time degree students is the number of units of study taken by part-time degree students divided by six. A unit of study represents one student per full course (3 hours per week for 2 terms or equivalent).

b) Students enrolled in programs leading to the baccalaureate degrees in the following professional fields, even though they may possess an honours undergraduate degree or equivalent are not considered to be graduate students: Social Work, Library Science, Law, Medicine, Teacher Education (except with respect to the recommendations regarding Library Study Space).

c) Graduate students, as a prerequisite possess an honours undergraduate degree or equivalent. The full-time equivalent of graduate students is the number of part-time graduate students multiplied by 0.3.

2. Student Contact Hours or Weekly Student Contact Hours

The number of hours per week of scheduled instruction (as indicated in the course description and generally stated in the university calendar) multiplied by the course enrolment. Laboratory contact hours correspond with scheduled instructional activities which are carried on through demonstration or experimentation and which normally demand equipment not available in the classroom. The student contact hours that are to be counted for the recommendations of the Task Force for classroom and laboratory (undergraduate) entitlement shall meet the following requirements:

i. They shall occur within a 45 hour week consisting of 5 or 6 blocks of consecutive time and such that each block is not to exceed 9 hours.

ii. They shall be recorded for a full week identified by each university but not to precede the last day on which course changes are allowed.

Student contact hours for health science programs are to be excluded.

3. Full-time, Full-time Equivalent Faculty

To include all faculty holding academic appointments. The full-time equivalent of part-time faculty is determined by dividing total part-time faculty salaries by the average salary of full-time faculty for the entire university. To be excluded are all staff on leave of absence or sabbatical leave, and also all faculty for health science and education programs.

4. Library Equivalent Volumes: determined by the following table of equivalent volumes recommended by Ontario Council of University Librarians:

Material	No. of items	Volume equivalency(i)
Volumes	125	125 volumes
Computer tapes	125	125
Documents, pamphlets Archives	1000 (items)	125
Microfilm (boxed on shelves)	400 (reels)	125
Microfiche, cards etc. (boxed on shelves cards etc.)	10,000	125
Newspapers current titles on display	7 (titles)	125
Newspapers unbound back files	7	125
Newspapers bound back files	9 (volumes)	125
Periodicals current titles on display	9 (titles)	125
Periodicals unbound boxed current year	30 (titles)	125
Periodicals boxed back files	included in volume count	
Phonodiscs - records	500	125
- tapes	500	125
- cassettes	1000	125
Reference	45 (volumes)	125
Slides (filed in a carousel boxed)	75 (carousels)	125
Films	125 films	125
Filmstrips (boxed)	2250 strips	125 volumes

(i) Materials are given in terms of 125 bound volumes since 125 bound volumes represent a standard stack - a single faced section, with dimensions approximately 7½ feet high, 7 shelves 3 feet wide.

For material stored in vertical files, cabinets, carousels, etc.

Material	No. of items	Volume equivalency
Maps	105	125
Microfilm (reels)	315	125
Micro-cards, fiche, etc.	7900	125
Pamphlets	790 (pamphlets)	125
Slides (in cases)		
Bound	2560(slides)	125
Unbound	5120(slides)	125
Filmstrips	580 strips	125
Mounted Photos	790 photos	125 volumes

5) Gross University Area: total gross university area maintained by the university. A detailed description of the measurement procedure is provided in the report, pages 23 to 27.